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01 AERODYNAMICS

Includes aerodynamics of bodies, combinations, internal flow in ducts and turbomachinery; wings, rotors, and control surfaces. For applications see: 02 Aircraft and 31 Space Vehicles. For related information see also: 12 Fluid Mechanics; and 33 Thermodynamics and Combustion.

N74-27469# Royal Aircraft Establishment, Farnborough (England).
CALCULATION OF THE EFFECT OF FRICTION ON THE LIFT OF A SLOTTED FLAP PROFILE
Steinheuer J. Aug. 1973 38 p refs Transl. into ENGLISH from the German report DLR-FB-73-04
(RAE-Lib-Trans-1717; BR37510; DLR-FB-73-04) Avail: NTIS HC $5.00

A procedure for a purely numerical determination of the lift of a slotted flap profile is described. The basis of the procedure is formed from well-known methods for the solution of the inviscid theoretical potential problem and for calculation of the boundary layer development. The validity of a new relation between loss of lift and skin-friction coefficient is confirmed by a comparison with measurements on a separate profile. The optimum position of a trailing edge slotted flap, calculated according to the present method, agrees very well with experimental results. Further test calculations demonstrate that the procedure correctly encompasses the effect of variation of Reynolds number. Author

N74-27470# Joint Publications Research Service, Arlington, Va.
AERODYNAMIC CHARACTERISTICS OF A FINITE-SPAN WING WITH A FLAP MOVING NEAR A SOLID WALL
V. P. Shadrin 1 Jul. 1974 8 p refs Transl. into ENGLISH from Gidrodinamika Nesushchikh Poverkhn. (Moscow), 1966 p 167-173
(JPRS-62357) Avail: NTIS HC $4.00

A derivation of simple finite equations for determining the lift, center of pressure, and hinge moment of a wing moving near a solid wall, as functions of the length and angle of rotation of the flap at various flight altitudes is presented. The conclusions concerning the possibility of replacing a water surface by a solid wall for calculations of the aerodynamic characteristics of a thin profile, traveling over water, make it possible to apply the results of the work to the problem of the motion of a finite-span wing with a flap over water. Author

N74-27471# Joint Publications Research Service, Arlington, Va.
AERODYNAMICS OF AIRFOILS
1 Jul. 1974 45 p refs Transl. into ENGLISH from the publ. "Gidrodinamika Nesushchikh Poverkhnostey" Moscow, 1966 44 p
(JPRS-62363) Avail: NTIS HC $5.25

The aerodynamic stability of moving airfoils is considered in relation to a barrier surface. For individual titles, see N74-27472 through N74-27476.

N74-27472 Joint Publications Research Service, Arlington, Va.
MOTION OF AN AIRFOIL WITH VARIABLE DISTANCE FROM A BARRIER
A. N. Panchenkov *In its* Aerodyn. of Airfoils (JPRS-62363) 1 Jul. 1974 p 1-6 refs Transl. into ENGLISH from the publ. "Gidrodinamika Nesushchikh Poverkhnostey" Moscow, 1966 p 200-205 (For availability see N74-27471 17-01)

During motion of a wing at variable distances from the barrier the problem will become nonstationary due to a change of influence of the barrier, and evaluation of the influence of this effect on the hydrodynamic characteristics of the wing is of tremendous importance in connection with problems of take-off and landing instability of air cushioned vehicles and aircraft. Thus, during analysis of a nonstationary motion of a wing near a barrier it is necessary to take into consideration two forms of nonstationary perturbations: perturbations of velocity and perturbations of distance from the barrier. Author

N74-27473 Joint Publications Research Service, Arlington, Va.
LONGITUDINAL STATIC STABILITY OF VEHICLES WITH TWO LIFTING WINGS **c02**
V. I. Korolev *In its* Aerodyn. of Airfoils (JPRS-62363) 1 Jul. 1974 p 7-13 Transl. into ENGLISH from the publ. "Gidrodinamita Nesushchikh Poverkhnostey" Moscow, 1966 p 216-222 (For availability see N74-27471 17-01)

The static stability of vehicles with two foils - leading and trailing (tandem system) separated by some distance, determined by the length of the hull of the vehicle, is analyzed. Author

N74-27474 Joint Publications Research Service, Arlington, Va.
PROBLEM OF NONSTATIONARY MOTION OF AN AIRFOIL NEAR A BARRIER
A. N. Lukashenko *In its* Aerodyn. of Airfoils (JPRS-62363) 1 Jul. 1974 p 14-22 refs Transl. into ENGLISH from the publ. "Gidrodinamika Nesushchikh Poverkhnostey" Moscow, 1966 p 206-215 (For availability see N74-27471 17-01)

The existing solutions of the problem of nonstationary motion of a wing near a barrier either pertain to special cases of the problem, or are satisfied by unwieldy analytical and numerical methods. The solution of a given problem, as in the case of a fine oscillating profile in a boundless fluid, reduces to the solution of some singular integral equation. A series of finite results for small Strouhal numbers of an oscillating wing, was obtained by the asymptotic method. Author

N74-27475 Joint Publications Research Service, Arlington, Va.
MOTION OF A SWEPT WING NEAR A SOLID BARRIER WITH OPTIMUM CIRCULATION DISTRIBUTION
P. I. Zinchuk *In its* Aerodyn. of Airfoils (JPRS-62363) 1 Jul. 1974 p 23-35 refs Transl. into ENGLISH from the publ. "Gidrodinamika Nesushchik Poverkhnostey" Moscow, 1966 p 174-187 (For availability see N74-27471 17-01)

The motion of a lifting surface is analyzed that consists of two wings, swept back in identical angle to a solid barrier. The wings are separated by some distance from each other. The acceleration potential method is used to solve the problem. Author

N74-27476 Joint Publications Research Service, Arlington, Va.
PROFILE DRAG OF WING MOVING NEAR SUPPORTING SURFACE WITH PARTIAL OBSERVANCE OF BOUNDARY VALUE CONDITIONS
E. A. Paravyan *In its* Aerodyn. of Airfoils (JPRS-62363) 1 Jul. 1974 p 36-42 refs Transl. into ENGLISH from the publ. "Gidrodinamika Nesushchikh Poverkhnostey" Moscow, 1966 p 160-166 (For availability see N74-27471 17-01)

The profile drag of a wing in a flow of a viscous incompressible fluid, located near another wing or barrier is analyzed by using the method of boundary layers and wakes of finite thickness.
Author

N74-27477# Joint Publications Research Service, Arlington, Va.
LIFTING SURFACE OF MEDIUM ASPECT RATIO IN SUBSONIC GAS FLOW
A. N. Panchenkov 27 Jun. 1974 11 p refs Transl. into ENGLISH from Sovremennyye Vopr. Gidrodinamiki (Moscow), 1967 p 120-129
(JPRS-62332) Avail: NTIS HC $4.00

An analytical theory of medium aspect ratio lifting surfaces is presented. The theory is based on the use of integral operators which transform the solutions of the two-dimensional Laplace equation to the solutions of elliptical equations. Wings of rectangular and triangular shape in plan are analyzed as applications of the general result. Mathematical models are developed to establish the relationships of the parameters. Results obtained from the mathematical models are presented in the form of graphs.
Author

N74-27478# Joint Publications Research Service, Arlington, Va.
MOTION OF VEHICLE WITH LIFTING AIRFOILS OVER RIPPLED WATER SURFACE
V. I. Korolev 27 Jun. 1974 6 p Transl. into ENGLISH from Gidrodinamika Bolshikh Skorestey (Moscow), no. 2, 1966 p 75-80
(JPRS-62337) Avail: NTIS HC $4.00

The motion of vehicles with lifting airfoils over rippled water surfaces is considered. It is shown that the calculations are acceptable in terms of frequency for waves of the length not exceeding 2L. The amplitude of the waves also must not exceed a determined height. With the vehicle in such motion, the increment of forces on the lifting surfaces depends only on the distance between the surfaces and the surface of the water. The nonstationary nature of the aerodynamic forces and the mutual influence of the airfoils are ignored. Mathematical models are developed to show the relationships of the parameters.
Author

N74-27479*# Kanner (Leo) Associates, Redwood City, Calif.
WIND TUNNEL INVESTIGATIONS AIMED AT DEVISING TESTS OF AIRCRAFT SPIN
J. Gobeltz and M. Vanmansart Washington NASA Jun. 1974 50 p Transl. into ENGLISH from the 10th Aerodyn. Appliquee (Lille), 7-9 Nov. 1973 42 p
(Contract NASw-2481)
(NASA-TT-F-15726) Avail: NTIS HC $5.50 CSCL 01A

The nature and characteristics, and the conditions of aircraft spin are studied in a conventional, and spin wind tunnel. An anemometer technique was adapted for this purpose. The results provide better insight into the spin phenomenon, and form a basis for developing means of recovering from spin. The use of a parachute and auxiliary jets as means of mastering aircraft spin are studied.
Author

N74-27480*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
PRESSURE MEASUREMENTS ON THE LEADING EDGE OF A SWEPT WING AT MACH 2.2
Russell B. Sorrells, III Washington Jun. 1974 109 p refs (NASA-TN-D-7506; L-9185) Avail: NTIS HC $4.50 CSCL 01A

Detailed pressure measurements were made on a flat semispan swept wing with a rounded leading edge at Mach number 2.2 through a range of Reynolds numbers. Pressure orifices were distributed in the streamwise direction at five spanwise stations on the leading edge and on the upper and lower surfaces. No significant amount of leading-edge suction was found, but the pressures and integrated normal forces on the upper and lower surfaces indicate the presence of a vortex lift.
Author

N74-27481# Joint Publications Research Service, Arlington, Va.
JET AIRFOIL CLOSE TO A FLAT BARRIER
V. I. Menshikov 26 Jun. 1974 10 p refs Transl. into ENGLISH from the book "Gidrodinamika Nesushchikh Poverkhnostey" Moscow, 1966 p 192-199
(JPRS-62323) Avail: NTIS HC $4.00

The characteristics of a streamline flow of an ideal liquid about a thin, flat airfoil located near a flat barrier at zero degrees angle of attack are discussed. A thin jet streams from the rear edge at a small angle to the chord of the airfoil. The motion of the liquid is assumed to be laminar and steady. Mathematical models and flow equations are presented to show the relationships of the parameters.
Author

N74-27482*# Scientific Translation Service, Santa Barbara, Calif.
S. A. CHAPLYGIN AND WING LIFT
S. A. Khristianovich Washington NASA Jul. 1974 10 p refs Transl. into ENGLISH from Priroda (Moscow), no. 4 (704), Apr. 1974 p 53-55
(Contract NASw-2483)
(NASA-TT-F-15752) Avail: NTIS HC $4.00 CSCL 01A

The history of the development of the laws of flight is reviewed. The study begins with the works of Isaac Newton, discusses the contributions of Stokes, Helmholtz, and Rayleigh and concludes with the research of S. A. Chaplygin.
Author

N74-27483*# Kanner (Leo) Associates, Redwood City, Calif.
ANALYSIS OF THE AERODYNAMIC CHARACTERISTICS OF DEVICES FOR INCREASING WING LIFT. 3: INFLUENCE OF GROUND PROXIMITY ON THE AERODYNAMIC CHARACTERISTICS OF THE FLAPS
Rafael Garncarek Washington NASA Jul. 1974 7 p Transl. into ENGLISH from Tech. Lotnicza Astronaut. (Warsaw), v. 28, Jun. 1973 p 21-29
(Contract NASw-2481)
(NASA-TT-F-15762) Avail: NTIS HC $4.00 CSCL 01A

The effect of ground proximity on the aerodynamic characteristics of flaps is discussed. Diagrams are presented which can be used to plot the aerodynamic characteristic of the aircraft taking into account the proximity of the ground. The conclusions based on the discussion are presented.
Author

N74-27484*# Kanner (Leo) Associates, Redwood City, Calif.
TURBULENT LIFT. COMMENTS ON SOME PRELIMINARY WIND TUNNEL TESTS
R. A. Westesson and U. Clareus Washington NASA Jun. 1974 33 p refs Transl. into ENGLISH from the Swedish report TP-74-51
(Contract NASw-2481)
(NASA-TT-F-15743; TP-74-51) Avail: NTIS HC $4.75 CSCL 01A

Three-dimensional tests were carried out to establish a stable and useful vortex in the tangential direction over a straight wing using tangential blowing on the upper side of the wing. When the tangential blowing was sufficiently strong, contact flow was obtained at very high angles of incidence. Quantitative data indicated that there was a decreased total drag at increasing tangential blowing and constant angle of incidence.
Author

N74-27485*# Boeing Commercial Airplane Co., Seattle, Wash.
STUDY OF THE SINGLE BODY YAWED-WING AIRCRAFT CONCEPT Contractor Report, 1 Jul. - 1 Dec. 1973
Robert M. Kulfan, James W. Nisbet, Frank D. Neuman, Edward J. Hamilton, James K. Murakami, John P. McBarron, and Kazuo Kumasaka May 1974 97 p refs
(Contract NAS2-7031)
(NASA-CR-137483) Avail: NTIS HC $8.00 CSCL 01B

Areas relating to the development and improvement of the single-fuselage, yawed-wing transonic transport concept were investigated. These included: (1) developing an alternate configuration with a simplified engine installation;(2) determining

a structural design speed placard that would allow the engine-airframe match for optimum airplane performance; and (3) conducting an aeroelastic stability and control analysis of the yawed-wing configuration with a flexible wing. A two-engine, single-fuselage, yawed-wing configuration was developed that achieved the Mach 1.2 design mission at 5560 km (3000 nmi) and payload of 18,140 kg (40,000 lb) with a gross weight of 217,700 kg (480,000 lb). This airplane was slightly heavier than the aft-integrated four-engine configuration that had been developed in a previous study. A modified structural design speed placard, which was determined, resulted in a 6% to 8% reduction in the gross weight of the yawed-wing configurations. The dynamic stability characteristics of the single-fuselage yawed-wing configuration were found to be very dependent on the magnitude of the pitch/roll coupling, the static longitudinal stability, and the dihedral effect. Author

N74-27486# Weapons Research Establishment, Salisbury (Australia).
THE JOINT NOL/RAE/WRE RESEARCH PROGRAMME ON BOMB DYNAMICS. PART 3: A LOW-DRAG BOMB WITH FREELY SPINNING STABILIZERS
F. J. Regan, J. H. W. Hannon, and F. J. Tanner Jun. 1973 74 p refs
(WRE-904(WR/D)) Avail: NTIS HC $6.75

Research on the free-fall dynamics of bombs was conducted as a cooperative program supported by organizations in the United States, United Kingdom and Australia. In addition to full-scale flight trials of instrumented research stores carried out by the Australian Weapon Research Establishment (WRE), wind-tunnel tests have been made on mutually agreed models at the Aircraft Research Association and Royal Aircraft Establishment (RAE) in England; the Naval Ordnance Laboratory (NOL) in the United States; and at Aeronautical Research Laboratories in Australia. RAE, NOL and WRE have separately prepared digital computer programs to simulate test vehicle trajectories using wind-tunnel measurements as inputs. Correlation between the predicted and observed flight results have provided considerable insight into problems associated with dynamic behavior during the critical release phase as well as stability criteria needed for good ballistic consistency. Results are presented relating to the study of free-fall stores having freely spinning cruciform and monoplane stabilizers. Author

N74-27487*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ACOUSTIC TESTS OF A 15.2 CENTIMETER-DIAMETER POTENTIAL FLOW CONVERGENT NOZZLE
Allen M. Karchmer, Robert G. Dorsch, and Robert Friedman Washington Jun. 1974 19 p refs
(NASA-TM-X-2980) Avail: NTIS HC $3.00 CSCL 20D

An experimental investigation of the jet noise radiated to the far field from a 15.2-cm-diam potential flow convergent nozzle has been conducted. Tests were made with unheated airflow over a range of subsonic nozzle exhaust velocities from 62 to 310m/sec. Mean and turbulent velocity measurements in the flow field of the nozzle exhaust indicated no apparent flow anomalies. Acoustic measurements yielded data uncontaminated by internal and/or background noise to velocities as low as 152m/sec. Finally, no significantly different acoustic characteristics between the potential flow nozzle and simple convergent nozzles were found. Author

N74-27488# Naval Postgraduate School, Monterey, Calif.
AN EXPERIMENTAL STUDY OF A VANE CONTROLLED JET FLAP GUST ALLEVIATION SYSTEM M.S. Thesis
Leonard Joseph Deal, Jr. Mar. 1974 77 p refs
(AD-777987) Avail: NTIS CSCL 01/1

An experimental effort to demonstrate the feasibility of an active gust alleviator using a fluidically actuated jet flap control system was undertaken. The wing model had a variable deflection jet at the trailing edge and was free to move in pitch only. A vane mounted ahead of the wing served as gust sensor and provided the signal which controlled jet angle. Experimental results showed the system capable of alleviating up to 92% of the motion caused by a sinusodial gust at constant amplitude. RMS values of wing rotation angle were found to be 0.68 degrees with control off and 0.29 degrees with control on when excited by a random two-dimensional gust. Author (GRA)

02 AIRCRAFT

Includes fixed-wing airplanes, helicopters, gliders, balloons, ornithopters, etc; and specific types of complete aircraft (e.g., ground effect machines, STOL, and VTOL); flight tests; operating problems (e.g., sonic boom); safety and safety devices; economics; and stability and control. For basic research see: 01 Aerodynamics. For related information see also: 31 Space Vehicles; and 32 Structural Mechanics.

N74-27489 Cornell Univ., Ithaca, N.Y.
BROADBAND AND DISCRETE FREQUENCY NOISE RADIATION FROM SUBSONIC ROTORS Ph.D. Thesis
Gregory F. Komicz 1973 238 p
Avail: Univ. Microfilms Order No. 74-10839

A unified approach to the prediction of both broadband and discrete frequency acoustic spectra radiation by aerodynamic rotors is presented. The fluctuating forces exerted by the blades on the fluid are modelled as a distribution of acoustic dipole singularities. An expression is then derived relating the far-field acoustic spectrum to the generalized cross-spectral density of the load fluctuations in both space and time. Extension to monopole and quadrupole type singularities is straightforward. Applications of the above relation to both broadband and discrete spectra are presented. A major source of random blade load fluctuations is the convection of a pattern of turbulent velocity through the rotor. Through use of linearized unsteady aerodynamic theory and the Taylor hypothesis, the cross-spectral density of the load fluctuations, and then the acoustic spectrum, are related directly to the three-dimensional power spectral density of the turbulence. Dissert. Abstr.

N74-27490* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
JET EXHAUST NOISE SUPPRESSOR Patent
Ronald G. Huff, inventor (to NASA) Issued 28 Jun. 1974 4 p Filed 9 Mar. 1973 Supersedes N73-21066 (11 - 12, p 1364)
(NASA-Case-LEW-11286-1; US-Patent-3,820,630; US-Patent-Appl-SN-339806; US-Patent-Class-181-33HB; US-Patent-Class-239-265.17) Avail: US Patent Office CSCL 01C

Noise suppression for a jet engine exhaust is provided by an annular divergent body attached to an exhaust nozzle. The smallest diameter of the divergent body is larger than the diameter of the exhaust nozzle exit to form an annular step which produces a shock wave in the exhaust as it passes the step. An annular shroud is disposed around the divergent body and causes outside air to pass through voids in the divergent body to mix with the jet exhaust gas. The divergent body includes a plurality of channels with separators between the channels.
Official Gazette of the U.S. Patent Office

N74-27491*+ National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
BIBLIOGRAPHY ON AIRCRAFT FIRE HAZARDS AND SAFETY. VOLUME 1: HAZARDS. PART 1: KEY NUMBERS 1 TO 817
James J. Pelouch, Jr., comp. and Paul T. Hacker, comp. May 1974 272 p refs
(NASA-TM-X-71553-Vol-1-Pt-1; E-7986-Vol-1-Pt-1) Avail: NTIS HC $6.50 CSCL 01C

Ignition temperatures of n-hexane, n-octane, n-decane, JP-6 jet fuel, and aircraft engine oil MIL-7-7808 (0-60-18) were determined in air using heated Pyrex cylinders and Nichrome wires, rods, or tubes. Ignition temperature varied little with fuel-air ratio, but increased as the size of the heat source was decreased. Expressions are given which define the variation of the hot surface ignition temperatures of these combustibles with the radius and the surface area of the heat source. The expressions are applicable to stagnant or low velocity flow conditions (less than 0.2 in./sec.). In addition, the hot gas ignition temperatures of the combustible vapor-air mixtures were determined with jets of hot

air. These ignition temperatures also varied little with fuel-air ratio and increased as the diameter of the heat sources was decreased. Author

N74-27492* + National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
BIBLIOGRAPHY ON AIRCRAFT FIRE HAZARDS AND SAFETY. VOLUME 2: SAFETY. PART 1: KEY NUMBERS 1 TO 524
James J. Pelouch, Jr., comp. and Paul T. Hacker, comp. May 1974 397 p refs
(NASA-TM-X-71553-Vol-2-Pt-1) Avail: NTIS HC $8.25 CSCL 01C

Bibliographic citations are presented to describe and define aircraft safety methods, equipment, and criteria. Some of the subjects discussed are: (1) fire and explosion suppression using whiffle balls, (2) ultraviolet flame detecting sensors, (3) evaluation of flame arrestor materials for aircraft fuel systems, (4) crash fire prevention system for supersonic commercial aircraft, and (5) fire suppression for aerospace vehicles. Author

N74-27493*# Scientific Translation Service, Santa Barbara, Calif.
FLIGHT CONTROL PROBLEMS FOR STEEP APPROACHES
R. Brockhaus Washington NASA Jun. 1974 34 p refs Transl. into ENGLISH of "Flugfuehrungsprobleme des Steilanfluges", Tech. Univ. Braunschweig, Zentrallstelle der Luftfahrtdokumentation, DGLR-Paper-73-027 presented at the Symp. on New Approach and Landing Tech., 2-4 May 1973, 34 p
(Contract NASw-2483)
(NASA-TT-F-15617; DGLR-Paper-73-027) Avail: NTIS HC $4.75 CSCL 01C

STOL approach methods are discussed including trajectory angles of 6 deg and 12 deg. Past STOL American projects are reviewed. It is found that STOL steep approaches involve the following: (1) design of flight control system, (2) area navigation system, (3) thrust control system, (4) development of microwave guide beam systems, (5) retraining of pilots, and (6) greatly increased reliability requirements on all systems. The information requirements for these approaches are compared with the information required for conventional ILS landings. Traffic control problems and traffic integration problems with conventional traffic are discussed. Author

N74-27494# Royal Aircraft Establishment, Farnborough (England).
GROUND LOADS ON THE NOSE UNDERCARRIAGE OF THE F-104G AIRCRAFT
O. Buxbaum Mar. 1974 68 p refs Transl. into ENGLISH from the German report TB-103
(RAE-Lib-Trans-1744; BR40625; TB-103) Avail: NTIS HC $6.50

The report gives the results of a statistical analysis of the forces measured on the nose landing gear of two F-104G aircraft during take-off, landing, and taxiing. Most, but not all, of the information required to build-up a fatigue loading spectrum was obtained. Author

N74-27495*# LTV Aerospace Corp., Hampton, Va. Technical Center.
A STRUCTURAL DESIGN FOR AN EXTERNALLY BLOWN FLAP (EBF) MEDIUM STOL RESEARCH AIRCRAFT
29 Dec. 1972 134 p
(Contract NAS1-10900)
(NASA-CR-112249) Avail: NTIS HC $9.75 CSCL 01C

Recent studies have indicated certain principle high-lift systems that appear attractive for application to STOL aircraft. One of these is the externally blown flap (EBF) concept where engine air is directed over the flap. In the design phase, an understanding of the dynamic characteristic of an externally blown flap high-lift wing is required. In order to generate a more thorough data base, a computer program to predict, by reference to structural drawings, the dynamic response of a high-lift STOL wing appears essential. The primary objective of this report is to provide structural stiffness, weight and loads information for input into a dynamic model analysis computer program. This data is presented in the form of sketches, weight and dynamic loads information graphs and tables for an external blown, triple-slotted flap, high-lift STOL transport wing. Author

N74-27496# TRW Systems, Redondo Beach, Calif.
FINAL DESIGN OF AN AT-GRADE GUIDEWAY FOR THE TRACKED AIR CUSHION RESEARCH VEHICLE Final Report, May - Nov. 1973
Donald D. Magura, William J. Cichanski, and Stephen G. Meisenholder Nov. 1973 164 p refs
(Contract DOT-TSC-442)
(TRW-96030-L014-0; FRA-ORD/D-74-50) Avail: NTIS HC $11.25

The final design is reported for an at-grade guideway for the 300 mph Tracked Air Cushion Research Vehicle (TACRV). Detailed drawings and specifications have been developed for this design so that it can be constructed at the DOT high speed ground test center. The guideway uses a continuously reinforced concrete pavement slab for the horizontal levitation surface and precast concrete panels for the vertical guidance surface. The guidance panels are attached to the slab by steel I-beams. Design features, design constraints, critical loads and cost estimates for this guideway structure are summarized and construction considerations and requirements for the foundation are described. Theoretical models and results of the static and dynamic analyses are included. Author

N74-27497*# Aerospace Corp., El Segundo, Calif.
AN ECONOMIC ASSESSMENT OF STOL AIRCRAFT POTENTIAL INCLUDING TERMINAL AREA ENVIRONMENTAL CONSIDERATIONS, VOLUME 1 Final Report
H. L. Solomon and S. Sokolsky Washington NASA May 1974 126 p refs 2 Vol.
(Contract NAS2-6473)
(NASA-CR-2424) Avail: NTIS HC $4.75 CSCL 01C

The results of an economic and environmental study of short haul airline systems using short takeoff and landing (STOL) aircraft are presented. The STOL system characteristics were optimized for maximum patronage at a specified return on investment, while maintaining noise impact compatibility with the terminal area. Supporting studies of aircraft air pollution and hub airport congestion relief were also performed. The STOL concept specified for this study was an Augmentor Wing turbofan aircraft having a field length capability of 2,000 ft. and an effective perceived noise level of 95 EPNdB at 500 ft. sideline distance. An economic and environmental assessment of the defined STOL system and a summary of the methodology, STOL system characteristics and arena characteristics are provided. Author

N74-27498*# McDonnell Aircraft Co., St. Louis, Mo.
CONCEPTUAL DESIGN STUDIES OF A V/STOL CIVIL LIFT FAN TRANSPORT INCLUDING EFFECT OF SIZE AND FAN PRESSURE RATIO
Washington NASA Jul. 1974 64 p refs
(Contract NAS2-5499)
(NASA-CR-2426) Avail: NTIS HC $3.75 CSCL 01C

Conceptual design studies of V/STOL Lift Fan Commercial short-haul transport aircraft for the 1980-85 time period were studied to determine their technical and economic feasibility. The remote lift fan configurations with a variation in fan pressure ratio from 1.2 to 1.5 were investigated. Also studied were variation in stage length from 200 nautical miles to 800 nautical miles and cruise Mach numbers of 0.75 and 0.85. These results indicate a four engine configuration was feasible. The 95 PNdb noise footprint would be approximately 45 acres and the DOC's would be about 60% greater than conventional transports. Author

N74-27499*# National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
FLIGHT EVALUATION OF ADVANCED CONTROL SYSTEMS AND DISPLAYS ON A GENERAL AVIATION AIRPLANE
Paul C. Loschke, Marvin R. Barber, Einar K. Enevoldson, and Thomas C. McMurtry Washington Jun. 1974 51 p refs
(NASA-TN-D-7703; H-783) Avail: NTIS HC $3.75 CSCL 01C

A flight-test program was conducted to determine the effect of advanced flight control systems and displays on the handling qualities of a light twin-engined airplane. A flight-director display and an attitude-command control system, used separately and in combination, transformed a vehicle with poor handling qualities during ILS approaches in turbulent air into a vehicle with good

handling qualities. The attitude-command control system also improved the ride qualities of the airplane. A rate-command control system made only small improvements to the airplane's ILS handling qualities in turbulence. Both the rate- and the attitude-command control systems reduced stall warning in the test airplane, increasing the likelihood of inadvertent stalls. The final approach to the point of flare was improved by both the rate- and the attitude-command control systems. However, the small control wheel deflections necessary to flare were unnatural and tended to cause overcontrolling during flare. Airplane handling qualities are summarized for each control-system and display configuration. Author

N74-27500*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DYNAMICS OF TILTING PROPROTOR AIRCRAFT IN CRUISE FLIGHT
Wayne Johnson May 1974 257 p refs Prepared in cooperation with Army Air Mobility Research and Development Lab., Moffett Field, Calif.
(NASA-TN-D-7677; A-5032) Avail: NTIS HC $6.50 CSCL 01C

A nine degree-of-freedom theoretical model is developed for investigations of the dynamics of a proprotor operating in high inflow axial flight on a cantilever wing. The basic characteristics of the rotor high inflow aerodynamics and the resulting rotor aeroelastic behavior are discussed. The problems of classical whirl flutter, the two-bladed rotor, and the influence of the proprotor on the stability derivatives of the aircraft are treated briefly. The influence of various elements of the theoretical model is discussed, including the modeling used for the blade and wing aerodynamics, and the influence of the rotor lag degree of freedom. The results from tests of two full-scale proprotors - a gimballed, stiff-inplane rotor and a hingeless, soft-inplane rotor - are presented; comparisons with the theoretical results show good correlation. Author

N74-27501*# Giravions Dorand Co., Paris (France).
ANALYTICAL STUDY OF STRESSES RECORDED IN THE DH 2011 ROTOR BLADES Final Report
Marcel Kretz, Jean-Noel Aubrun, and Marc Larche Jul. 1973 92 p refs Sponsored in part by Army Air Mobility R and D Lab.
(Contract NAS2-3673)
(NASA-CR-137527; DH-2011-C-E1) Avail: NTIS HC $7.75 CSCL 01C

An analytical study of stresses in the blades recorded during the tests of the DH 2011 jet flap rotor was performed. The main objective of the study was to compare the experimental results with analyticaly determined stresses. The comparison extended over 15 specific flight cases has been only partially successful. In fact computed 3P and 4P stress components showed only a poor correlation with the test data obtained. It is believed that the simplified model of aeroelastic effects used is mainly responsible for this lack of agreement with test results. Author

N74-27502# Joint Publications Research Service, Arlington, Va.
MINIMA FOR LANDING AIRCRAFT
S. L. Belogorodskiy 17 Jun. 1974 8 p Transl. into ENGLISH from Grazhdanskaya Aviatsiya (Moscow), no. 10, 1971 p 20-21
(JPRS-62252) Avail: NTIS HC $4.00

A method for determining takeoff and landing minimum conditions for civil aviation aircraft operators is described. Instead of cloud base altitude as the basis for determining minimum landing conditions, it is recommended that decision altitude be used. Using the decision altitude, it is possible for the pilot to obtain the information required for range of visbility along the runway in time to make necessary corrections. This in turn determines the conditions under which it is permissible to begin the landing approach. Author

N74-27503*# Kanner (Leo) Associates, Redwood City, Calif.
ON THE USE OF BRANCH MODES FOR THE CALCULATION OF HELICOPTER STRUCTURAL DYNAMIC CHARACTERISTICS
C. T. Tran, W. Twomey, and R. Dat Washington NASA Jul. 1974 45 p refs Transl. into ENGLISH from Rech. Aerosp. (France) no. 6, Nov. - Dec. 1973 p 337-354
(Contract NASw-2481)
(NASA-TT-F-15713) Avail: NTIS HC $5.25 CSCL 01C

The dynamic characteristics of the complete helicopter structure, including fuselage and rotor, are determined from the normal branch modes which characterize separately the fuselage and the blades. With an appropriate choice of coordinates, a set of second order linear differential equations with constant coefficients is obtained. The solutions define natural vibration modes which vary with the blade rotational speed. The results obtained on a helicopter model agree with the experiment. Author

N74-27504# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario). Behavioural Sciences Div.
NOISE LEVELS IN THE CH-113A AND CUH-IN HELICOPTER
R. A. Strong and R. B. Crabtree Dec. 1973 10 p ref
(DCIEM-73-R-993) Avail: NTIS HC $4.00

Noise levels were measured on board the CUH-IN and CH-113A helicopters. Properly fitted flight helmets provide adequate hearing protection for personnel in the cockpits of both aircraft and in the cargo/passenger area of the CUH-IN. However ear plugs or ear muffs do not provide adequate hearing protection for flight exceeding two hours in the cargo/passenger area of the CH-113A. Author

N74-27505*# Pennsylvania State Univ., University Park.
INVESTIGATION OF THE LARGE SCALE COHERENT STRUCTURE IN A JET AND ITS RELEVANCE TO JET NOISE
Roger E. A. Arndt and W. K. George [1974] 20 p refs
(Grant NGR-39-009-270)
(NASA-CR-138908) Avail: NTIS HC $4.00 CSCL 20A

A study was conducted to determine the causes of aircraft noise in large jet aircraft. It was determined that jet noise varies strongly with velocity and that significant pure tones are generated by rotor-stator interaction in the jet engines. An objective method for deducing the large eddy structure in a large jet is described. The provisions of lighthill's theory are analyzed and applied to investigating the nature of jet noise. There is considerable evidence that a large scale coherent structure exists in a jet and that this structure can play a major role in sound radiation. Mathematical models are developed to define the parameters of orthogonal decomposition, finite extent velocity field, homogeneous fields, and periodic velocity fields. Author

N74-27506# Royal Aircraft Establishment, Farnborough (England).
DETERMINATION OF THE DERIVATIVES OF LONGITUDINAL MOTION OF AN AIRCRAFT FROM FLIGHT DATA BY A MODEL WITH AUTOMATIC PARAMETER ADJUSTMENT
R. Koehler Jan. 1974 27 p refs Transl. into ENGLISH from the German report DLR-FB-73-13
(RAE-Lib-Trans-1740; BR39731; DLR-FB-73-13) Avail: NTIS HC $4.50

A circuit is discussed for determining the derivatives of an aircraft from flight data, which needs relatively few computing elements in an analogue computer. Since the analysis also covers quadratic terms, the polar can be determined from the coefficients as found in the neighbourhood of a point. The results of an evaluation of flight data are discussed. Author

N74-27507# Technology, Inc., Dayton, Ohio.
T-38 STRUCTURAL FLIGHT LOADS DATA FOR JUNE 1970 THROUGH DECEMBER 1971 Final Report, 1 Jun. 1970 - 31 Mar. 1972
Larry E. Clay and Ronald I. Rockafellow Mar. 1972 148 p refs
(Contracts F33657-70-D-1161; F33657-71-D-0662)
(AD-758891; ASD-TR-72-54) Avail: NTIS HC $3.00 CSCL 01/3

In a fifth part of a continuing T-38 Service Loads Recording Program (SLRP) to cover the period from 1 June 1970 through 31 December 1971, 4265 hours of VGH data were recorded by A/A24U-10 magnetic tape recording systems installed in

twenty-eight T-38 aircraft: 22 fleet and 6 lead-the-force T-38's operating from Williams, Reese, and Moody Air Force Bases. As in previous reports, the data presentation includes curves showing normal load factor (nz) exceedances above each nz level per thousand flight hours. Only one nz exceeded 7.8 (design limit is 7.33), and the comparison of the exceedance curves for the current and previous programs substantiated that the T-38 nz spectrum had remained unchanged during the T-38 SLRP. (Author modified abstract) GRA

N74-27508# Westinghouse Electric Corp., Baltimore, Md. Systems Development Div.
COBRA WINDOW DESIGN ANALYSIS AND NO GLARE CANOPY DESIGN Final Report
Richard H. Daumit and James B. Kiesel Mar. 1974 37 p ref
(Contracts DAAD05-72-C-0284; DAAD05-73-C-0305)
(AD-778165; LWL-CR-06P72) Avail: NTIS CSCL 01/3

The report details the work related to the redesign and modification of the canopy of the Attack Helicopter (AH-1G) to minimize sun reflections and thereby reduce the probability of detection through visual observation. There were two objectives in this effort, namely: Canopy redesign through analysis of directional components of reflections; and computer analysis of the design in a modified version of a special program developed in earlier work entitled Cobra Glint Model, AH-1G. (Modified author abstract) GRA

N74-27509# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE EFFECT OF WIPICS ON THE F4-B TO N CONVERSION PROGRAM Final Report, Jun. 1973 - Apr. 1974
Norman K. Womer Apr. 1974 47 p refs
(AD-777256; AFIT-TR-74-5; AU-5-1974-AFIT-ENS) Avail: NTIS CSCL 15/5

The report provides the underlying theory and methods used to determine the affect of the Work in Process Inventory Control System (WIPICS) on the F4-B to N conversion program and the Naval Air Rework Facility, North Island, California. The report documents cost savings of 3.24% of the before WIPICS. It also concludes that these cost savings are statistically significant at the 10% level. Author (GRA)

N74-27510# Honeywell, Inc., Minneapolis, Minn. Government and Aeronautical Products Div.
HYDROFLUIDIC YAW SAS ANALYSIS DESIGN AND DEVELOPMENT Final Report, 1 Apr. 1972 - 1 Oct. 1973
Harvey D. Ogren Mar. 1974 62 p refs
(Contract DAAJ02-72-C-0051; DA Proj 1F1-62204-AA-44)
(AD-777804; GAPD-W0517-FR; USAAMRDL-TR-74-4) Avail: NTIS CSCL 01/3

The objective of this program was to design and develop the integrated sensor/controller/series servoactuator package of a hydrofluidic stability augmentation system which will be subsequently demonstrated during operatonal suitability tests. The sensor/controller was designed based on the performance of a breadboard model that was flight tested in the OH-58A helicopter. From the flight test program, the system gain was increased and a straight rate loop was added as a result of pilot requests. The final system gain was 0.023 inch of servoactuator per degree per second of rate input. The straight rate loop gain was set at 10% of the system gain. Temperature compensation was incorporated into the various circuits by adding negative feedback that contained a viscous resistor. This technique reduced the gain change versus temperature that was obtained in the past. (Modified author abstract) GRA

N74-27511# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
ANALYSIS OF FACTORS INFLUENCING RATE OF RISE OF LARGE SCIENTIFIC BALLOONS Instrumentation Papers
George F. Nolan and Patrick L. Keeney 18 Dec. 1973 18 p
(AF Proj. 6665)
(AD-778070; AFCRL-TR-73-0753; AFCRL-IP-209) Avail: NTIS CSCL 01/3

By means of multiple regression analysis, two regression equations have been produced which can be used as aids in predicting the rate of rise of large scientific balloons. The predictors in the equations are quantities that are routinely available in balloon flight operations. Free lift was found to be important as a predictor of ascent rate only in the stratosphere. In the troposphere, atmospheric pressure and temperature lapse rate are effective predictors of departures of ascent rate from overall mean ascent rate. Author (GRA)

N74-27512# Army Aviation Systems Command, St. Louis, Mo.
MAJOR ITEM SPECIAL STUDY (MISS), OH-6 A TAIL ROTOR ASSEMBLY Interim Report, Jan. 1964 - Jul. 1973
Apr. 1974 22 p
(AD-778166; USAAVSCOM-TR-74-22) Avail: NTIS CSCL 01/3

The report is designed to illustrate cost savings which would result from specific efforts in the areas of product improvement in quality and design. For the purpose of this study the cost savings produced in the area of product improvement are based on total elimination of a certain failure mode or modes. Appropriate modes are chosen because of their proportion of the total removals or their proportion in combination with other similar modes. These eliminated removals are then assumed to follow the distribution of the remaining removal modes. The actual cost savings are determined from the increase in the mean time to removal based on the new removal distributions. GRA

N74-27513# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
APPLICATION OF AN OPTIMAL CONTROL PILOT MODEL TO AIR-TO-AIR COMBAT M.S. Thesis
Thomas R. Harvey Mar. 1974 104 p refs
(AD-777847; GA/MA/74-M-1) Avail: NTIS CSCL 15/7

The two-dimensional (longitudinal) kinematics of air-to-air combat tracking with a lead computing optical sight system were simulated on an analog computer. Three pilots flew three different aircraft configurations on the fixed-base simulator at 3000- and 1000-foot ranges against a target driven to RMS accelerations of 3.5 G and 5.0 G by filtered, white, Gaussian noise. Averaged RMS data were recorded on attacker's elevator deflection, pitch rate, lead angle, line of sight to the target, and tracking error for each case. (Modified author abstract) GRA

N74-27514# Army Air Mobility Research and Development Lab., Fort Eustis, Va.
AN EXPERIMENTAL AND ANALYTICAL INVESTIGATION OF THE POTENTIAL FLOW FIELD, BOUNDARY LAYERS, AND DRAG OF VARIOUS HELICOPTER FUSELAGE CONFIGURATIONS
James Gillespie, Jr. and Richard I. Windsor Jan. 1974 62 p refs
(AD-777798; USAAMRDL-TN-13) Avail: NTIS CSCL 01/1

An investigation has been performed to analytically determine the flow field about a helicopter fuselage and to apply the results to the prediction of parasite drag. The analytical method is currently restricted to nonlifting bodies in nonyawed flow. The flow field is determined by using the Douglas-Neumann computer program for the potential field and a boundary layer analysis based upon the small cross-flow assumption. Pressure distribution correlation between test data and the Douglas-Neumann program is very good except for areas of separated flow. Agreement is also good between boundary layer velocity profiles obtained from test data and from the boundary layer analysis. An empirical approach based on test data is used to approximate the pressure in the separated region. Drag is obtained by numerical integration of the pressure and skin friction distribution. Agreement is reasonable between test data and the drag obtained by the summation process. The analytical method has potential application in the design of helicopter fuselages of minimum parasite drag. Author (GRA)

N74-27515# Arkansas Univ., Little Rock. Medical Center.
TRANSMISSION THERMAL MAPPING (UH-1 MAIN ROTOR TRANSMISSION) Final Report, Jul. 1972 - Feb. 1973
J. H. Drennan and R. D. Walker Dec. 1973 88 p
(Contract DAAJ02-72-C-0081; DA Proj. 1G1-62207-AA-72)
(AD-777803; BHC-299-099-652; USAAMRDL-TR-73-90) Avail: NTIS CSCL 01/3

The report contains the results of a series of tests conducted to obtain thermal maps of a UH-1 main rotor transmission. The

tests were conducted at several torque levels and several stabilized oil-out temperatures. Also, the thermal growth of the transmission cases at selected locations was measured and recorded. The general conclusions of this report are summarized as follows: the major heat generating area was the input spiral bevel pinion and its related bearings; thermal stability could not be attained at full bypass of the oil cooler at 60% torque; thermal gradients indicate that the transmission output mast may be efficiently utilized as a heat sink by pressure wetting the surface.
Author (GRA)

N74-27516# Firestone Coated Fabrics Co., Magnolia, Ark.
EVALUATION OF VARIOUS SIZES AND CONFIGURATIONS OF FUEL TANKS Final Report
D. L. Byerley Dec. 1973 51 p
(Contract DAAJ02-71-C-0031; DA Proj. 1F1-62203-A-529)
(AD-777801; FCFC-2097; USAAMRDL-TR-73-74) Avail: NTIS CSCL 13/4

Eighteen tanks with a 30-inch x 30-inch base dimension and heights of 48 and 60 inches of qualified crashworthy constructions were impacted from 65 feet. Nine of these failed adjacent to fittings on side panels. All tanks without side fittings passed the impact test regardless of constructions used and with average densities varying from 1.11 to 1.75. Indicated pressures were in the 130-150 psi range for two tanks of Firestone 1550-1 construction and 170-200 psi for a reinforced, heavier revision of this construction. (Modified author abstract) GRA

N74-27517# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
THE LOCAL MOTIONS OF A PAYLOAD SUPPORTED BY A TRITETHERED NATURAL SHAPE BALLOON Interim Report
Richard C. Leclaire and Catherine B. Rice 12 Dec. 1973 45 p refs
(AF Proj. 6665)
(AD-777829; AFCRL-TR-73-0748; AFCRL-IP-206) Avail: NTIS CSCL 01/3

The report compares the payload motions during flights of a 793 cubic meter (28,000 cubic feet) natural-shape balloon on a tritethered cable array with those using an identical balloon on a single cable. Nominal altitudes were 457 m (1500 ft), 610 m (2000 ft), and 762 m (2500 ft) above ground level at Holloman AFB and White Sands Missile Range, New Mexico. Winds ranged from 0.5 m/sec to 12 m/sec (1 to 23 knots). The payload location relative to the balloon was varied and the balloon was flown with different values of free lift and elevation angles. Target position, tangential speed, and acceleration were determined by using the WSMR cinetheodolite system. Telemetry included pitch and roll gyros, a flux-gate compass, accelerometers, and an anemometer. With both types of cable arrangement, one component of the motion was an oscillation similar in order of magnitude of frequency and orientation to the classic transverse oscillations of a sphere due to periodic vortex shedding in its wake. Author (GRA)

N74-27518# Schjeldahl (G. T.) Co., Northfield, Minn. Advanced Programs Div.
PORTABLE TETHERED BALLOON WIND DATA (HUGO 2) Final Report, May 1972 - Jan. 1974
Charles D. Corbin Jan. 1974 213 p
(Contract F19628-72-C-0294; AF Proj. 133B)
(AD-777875; SER-0179; AFCRL-TR-74-0034) Avail: NTIS CSCL 04/2

The HUGO II system, developed, integrated, and tested under Contract F19628-72-C-0294 with the Air Force Cambridge Research Laboratories, is a portable tethered balloon wind data system. Operating at an altitude of 2000 feet above ground level, at ground levels to 6000 feet MSL, the 30,000 cubic foot aerodynamically-shaped balloon supports tether cable-mounted sensor packages, or Aerosondes, at as many as three points along the cable. The Aerosondes collect wind speed, wind direction, and temperature data for transmission, command, to the Ground Station an integral part of the Balloon Launch Vehicle. The system is self-contained. The Balloon Launch Vehicle (LBV) is equipped for over-the-road transport. It contains all the equipment required to operate the HUGO II balloon. An integral part of the BLV is a unique mooring mast which is hinged for transport. The mooring system consisting of the trailer-supported mast and a weighted dolly, is designed to moor the balloon in winds to 70 knots. Self-sufficiency is enhanced by a self-contained 10-kilowatt power generator and gasoline-powered hydraulic-coupled tether cable winch. Author (GRA)

N74-27473 Joint Publications Research Service, Arlington, Va.
LONGITUDINAL STATIC STABILITY OF VEHICLES WITH TWO LIFTING WINGS
V. I. Korolev *In its* Aerodyn. of Airfoils (JPRS-62363) 1 Jul. 1974 p 7-13 Transl. into ENGLISH from the publ. "Gidrodinamita Nesushchikh Poverkhnostey" Moscow, 1966 p 216-222 (For availability see N74-27471 17-01)

N74-28400* Kanner (Leo) Associates, Redwood City, Calif.
AIRCRAFT NOISE IN THE REGION OF THE BUCHAREST-OTOPENI AIRPORT
M. Costescu, C. Gherghel, and A. Curtoglu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 233-237 ref Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica, Vol. 1,A, Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 301-305 (For availability see N74-28363 17-32)
CSCL 20A

03 AUXILIARY SYSTEMS

Includes fuel cells, energy conversion cells, and solar cells; auxiliary gas turbines, hydraulic, pneumatic and electrical systems; actuators; and inverters. For related information see also: 09 Electronic Equipment; Nuclear Engineering; and 28 Propulsion Systems.

N74-27519* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
BATTERY TESTING DEVICE Patent
William A. Boshers, inventor (to NASA) Issued 18 Jun. 1974 5 p Filed 24 Jan. 1973 Supersedes N73-17037 (11 - 08, p 0869)
(NASA-Case-MFS-20761-1; US-Patent-3,818,325;
US-Patent-Appl-SN-326327; US-Patent-Class-324-29.5;
US-Patent-Class-324-72.5; US-Patent-Class-136-182) Avail: US Patent Office CSCL 10C

A battery testing device is described for testing the cells of a multiple-cell battery, the battery having a cover plate with access holes to provide access to the connecting straps between cells. A panel of probe assembly receiving holes is located to correspond to the location of the access holes when the panel is positioned on top of the battery. A probe assembly is positioned within each probe assembly receiving hole, with a spring biased electrically conductive plunger to make electrical contact with the connecting strap through the corresponding access hole when the panel is pushed towards the top of the battery.
Official Gazette of the U.S. Patent Office

N74-27520 Rensselaer Polytechnic Inst., Troy, N.Y.
RELATIONSHIP OF ELECTRODE STRUCTURES AND CELL PERFORMANCE IN SEALED, SINTERED-TYPE NICKEL-CADMIUM BUTTON CELLS DURING CYCLING Ph.D. Thesis
David L. Chua 1974 267 p
Avail: Univ. Microfilms Order No. 74-12781

The possible correlation between the performance of the nickel-cadmium cell and the morphological structures of the plates during prolonged cycling was studied. Sealed nickel-cadmium cells made of sintered plates were found to exhibit capacity degradation during extended charge-discharge cycles. Under slow to moderate discharge rates, drastic changes in negative plate's morphology occured. For the Cd/Cd(OH) 2 plates, the derived general plate morphologies were consistent with a dissolution precipitation mechanism during discharge and one involving dissolution electrodeposition during charge. Under very fast discharge rate, the observed general electrode morphologies were correlated partially to a solid state mechanism. Dissert. Abstr.

N74-27521# Royal Aircraft Establishment, Farnborough (England).
NUMERICAL COMPUTATION OF THREE-DIMENSIONAL MAGNETIC FIELDS IN LARGE TURBOGENERATORS WITH FIELD-DEPENDENT PERMEABILITY AND OPTIONAL CURRENT DENSITY DISTRIBUTION
Wilhelm Muller and Wilhelm Wolff Jan. 1974 23 p refs Transl. into ENGLISH from Elektrotech. Z., A (West Germany), v. 94, no. 5, 1973 p 276-282
(RAE-Lib-Trans-1742; BR39610) Avail: NTIS HC $4.25

A method is described which enables two- or three-dimensional magnetic fields in turbogenerators to be numerically computed for the case of field-dependent anistropic permeability and optionally selected current density distributions. A scalar magnetic potential is used as a system quantity from which the eddy-free part of the field is derived by gradient formation. The other part of the field results from integration of the Biot-Savart equation over the given current density. The calculations are carried out in a lattice net made up of several regions to suit various positions of the rotor in the generator. The very large number of equation systems resulting from a discrete treatment of the problem were solved by the block SOR iteration method; in doing this, particular importance was attached to the most accurate possible determination of the iteration parameters. Altogether, just under 1 hour's computer time was required on the Telefunken TR 440 computer for a three-dimensional 10000 point problem with an error of some tenths of a milli-Tesla. Furthermore, the program enabled the fields in the part of the generator which was of interest to be accurately calculated by the 'frozen potential' method using an improved lattice. Author

N74-27522*# Brown Univ., Providence, R.I. Div. of Engineering.
METHODS OF IMPROVING THE EFFICIENCY OF PHOTOVOLTAIC CELLS Semiannual Report, 1 Sep. 1973 - 28 Feb. 1974
J. J. Loferski, B. Roessler, E. E. Crisman, L. Y. Chen, and R. Kaul 28 Feb. 1974 32 p refs
(Grant NGR-40-002-093)
(NASA-CR-138485; SAR-8) Avail: NTIS HC $4.75 CSCL 10A

Work on aluminum-alloyed silicon grating cells is continued. Optimization of the geometry (grating line width and spacing) confirms the analysis of such cells. A 1 sq cm grating cell was fabricated and its i-V characteristic was measured under an AMO solar simulator. It is found that the efficiency of this cell would be about 7.9%, if it were covered by the usual antireflection coating. The surface of the cell is not covered by a diffused junction. The response is blue shifted; the current is somewhat higher than that produced by a commercial Si cell. However, the open circuit voltage is low, and attempts to optimize the open circuit voltage of the aluminum-alloy junctions are described. A preliminary X-ray topographic examination of GaAs specimens of the type commonly used to make solar cells is studied. The X-ray study shows that the wafers are filled with regions having strain gradients, possibly caused by precipitates. It is possible that a correlation exists between the presence of low mechanical perfection and minority carrier diffusion lengths of GaAs crystals. Author

N74-27523*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
GENERAL SURVEY OF SOLID-WASTE MANAGEMENT
Terrence G. Reese and Richard C. Wadle May 1974 36 p refs
(NASA-TM-X-58133; JSC-08696) Avail: NTIS HC $3.25 CSCL 06I

Potential ways of providing solid-waste management for a building complex serviced by a modular integrated utility system (MIUS) were explored. Literature surveys were conducted to investigate both conventional and unusual systems to serve this purpose. The advantages and disadvantages of the systems most compatible with MIUS are discussed. Author

N74-27524# Interior Dept., Washington, D.C. Office of Coal Technology.
CLEAN ENERGY FROM COAL TECHNOLOGY
1973 43 p
Avail: SOD HC $0.75

The potential use of coal as the primary fossil fuel to meet future energy requirements is discussed. The abundance of coal, and conversion of coal to other fuels are described with emphasis on gasification. F.O.S.

N74-27525# Committee on Government Operations (U. S. House).
CONSERVATION AND EFFICIENT USE OF ENERGY, PART 2
Washington GPO 1973 350 p refs Hearings before Comm. on Govt. Operations and Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., 10 Jul. 1973 Prepared in cooperation with Comm. on Sci. and Astronautics 4 Vol.
(GPO-24-290) Avail: Subcomm. on Conservation and Natural Resources

The problem of growing demands for energy spurred on by an expanded economy and coupled to shrinking supplies is considered. Stringent environmental standards prevent wider use of the most plentiful fossil fuel resources. The formulation of a national policy for energy conservation and efficient use of energy is investigated. G.G.

N74-27526# Committee on Government Operations (U. S. House).
CONSERVATION AND EFFICIENT USE OF ENERGY, PART 3
Washington GPO 1973 698 p refs Hearings before Comm. on Govt. Operations and Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., 11 Jul. 1973 Prepared in cooperation with Comm. on Sci. and Astronaut. 4 Vol.
(GPO-24-682) Avail: Subcomm. on Conservation and Natural Resources

The overall aspects of the energy production-transmission-consumption system are considered and related environmental issues are stressed. An energy conservation policy is advocated that combines the efforts of government, industry, and private citizens. G.G.

N74-27527# Committee on Government Operations (U. S. House).
CONSERVATION AND EFFICIENT USE OF ENERGY, PART 4
Washington GPO 1973 454 p refs Hearings before Comm. on Govt. Operations and Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., 12 Jul. 1973 Prepared in cooperation with Comm. on Sci. and Astronaut. 4 Vol.
(GPO-25-654) Avail: Subcomm. on Conservation and Natural Resources

Various energy conversion and supply processes are outlined and the need for a national energy policy is emphasized in the face of increased energy demands. G.G.

N74-27528*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF A BRAYTON POWER SYSTEM WITH A SPACE TYPE RADIATOR
Ralph C. Nussle, George M. Prok, and David B. Fenn Washington Jul. 1974 27 p refs
(NASA-TN-D-7708; E-7799) Avail: NTIS HC $3.25 CSCL 10A

Test results of an experimental investigation to measure Brayton engine performance while operating at the sink temperatures of a typical low earth orbit are presented. The results indicate that the radiator area was slightly oversized. The steady state and transient responses of the power system to the sink temperatures in orbit were measured. During the orbital operation, the engine did not reach the steady state operation of either sun or shade conditions. The alternator power variation during orbit was + or - 4 percent from its mean value of 9.3 kilowatts. Author

N74-27529# Kentucky Univ., Lexington. Inst. for Mining and Minerals Research.
A KENTUCKY COAL UTILIZATION RESEARCH PROGRAM. PROJECT 3: LOW BTU GAS AND SOLID DESULFURIZED FUEL Annual Report, 1 Jul. 1972 - 30 Jun. 1973
Nov. 1973 132 p refs

Avail: NTIS HC $9.75

Processes to produce a solid desulfurized fuel at the lowest cost per Btu and per KWhr were evaluated. It became apparent that the price of energy from the so-called environmentally clean fuels will continue to rise and that most processes will become economical before the technology has been fully demonstrated in a so-called commercial or demonstration plant. Evaluation of producer gas processes showed that the fixed bed atmosphere gas producer has the lowest fuel cost of presently available processes. A computer program has been developed to assist us in the analysis of a fixed bed gasifier and prediction of its performance. The available data on the sulfur content in Kentucky coals and their associated reserves have been assembled. A short evaluation of the various coal cleaning procedures was completed and a more extensive program on coal washing, coal blending and evaluation of a sulfur leaching process was initiated. Author

N74-27530# Kentucky Univ., Lexington. Inst. for Mining and Minerals Research.

A KENTUCKY COAL UTILIZATION RESEARCH PROGRAM. PROJECT 4: MEASUREMENT OF INHIBITION ISOTHERMS FOR KENTUCKY COAL Annual Report, 1 Jul. 1972 - 30 Jun. 1973

Oct. 1973 41 p refs

Avail: NTIS HC $5.25

Brushed and sieved coal was fluidized in 10 gram batches in a 22 mm ID quartz reactor up to a temperature of 870 C. The release of H2S during heatup under nitrogen and at the run temperature under the same gas (pyrolysis), hydrogen, or hydrogen-hydrogen sulfide mixtures was followed by gas chromatography. The residue or char was analyzed for pyritic, organic, sulfide, sulfate, and total sulfur. Inhibition isotherms, equilibria between sulfur in the char and gaseous hydrogen sulfide, were measured at 600 and 870 C. At the lower temperature the isotherm was found to be independent of the hydrogen sulfide concentration in the gas stream and the char sulfur content remained constant at 2.6%. In addition to the inhibition isotherms, sulfur-form transformation diagrams were constructed for coal treated with nitrogen, hydrogen, and hydrogen-hydrogen sulfide mixtures. Pyritic sulfur, which comprised 40% of the sulfur in the original coal, was completely converted to ferrous sulfide at 600 C in hydrogen and 740 C in nitrogen. At 870 C the sulfur content of the char produced under hydrogen was 1.1%. Author

N74-27531# Kentucky Univ., Lexington. Inst. for Mining and Minerals Research.

A KENTUCKY COAL UTILIZATION RESEARCH PROGRAM: SUMMARY OF FIRST YEAR PROGRESS AND ACCOMPLISHMENTS

Oct. 1973 9 p

Avail: NTIS HC $4.00

The cost controlling processing stages in the liquefaction of coal are considered. These stages include the hydrogen supply, the separation of ash solids from coal oil, and catalysis for the solvation-hydrogenation approach to coal liquefaction; and reactor design and char utilization for the pyrolysis approach. Innovation research in these areas has the potential to provide a substantial improvement in the economics of large scale coal liquefaction. Author

N74-27532# Commission of the European Communities, Brussels (Belgium).

PROBLEMS, RESOURCES AND NECESSARY PROGRESS IN COMMUNITY ENERGY POLICY 1975 - 1985

[1974] 54 p refs

Avail: NTIS HC $5.75

Demand prospects and future supply situations for principle sources of primary energy are considered in this descriptive synthesis of the essential problems of energy policy which will be encountered between now and 1985. Available policy options are identified and their individual consequences are evaluated. Author

N74-27533# Commission of the European Communities, Brussels (Belgium).

PROSPECTS OF PRIMARY ENERGY DEMAND IN THE COMMUNITY (1975 - 1980 - 1985)

[1974] 121 p refs

Avail: NTIS HC $9.25

Trends in the energy demand during the years 1960 to 1970 are analyzed and used to project future energy requirements up to 1985. The effects of various economic parameters on this trend analysis are considered in deriving long term consumption aspects. G.G.

N74-27534*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ASSESSMENT AND CONTROL OF ELECTROSTATIC CHARGES

Matthew Barrett May 1974 53 p refs

(NASA-SP-8111) Avail: NTIS HC $3.75 CSCL 20C

The experience is described of NASA and DOD with electrostatic problems, generation mechanisms, and type of electrostatic hazards. Guidelines for judging possible effects of electrostatic charges on space missions are presented along with mathematical formulas and definitions. Author

N74-27535*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

STRUCTURE AND FUNCTION OF AN INORGANIC-ORGANIC SEPARATOR FOR ELECTROCHEMICAL CELLS: PRELIMINARY STUDY

John M. Bozek Washington Jul. 1974 16 p refs

(NASA-TM-X-3080; E-7871) Avail: NTIS HC $3.00 CSCL 10A

The structure of a new separator material for electrochemical cells has been investigated. Investigation into details of the separator structure showed it to be multilayered and to consist mainly of a quasi-impervious organic skin, a porous region of mixed organic and inorganic material, and an area of nonuniformly treated substrate. The essential feature of the coating (slurry) is believed to be interconnected pores which allow ionic conductivity. The interconnected pores are believed to be formed by the interaction of the plasticizer and inorganic fibers. The major failure mode of silver zinc cells using such a separator (zinc nodules shorting adjacent plates) was investigated. Author

N74-27536# Sydney Univ. (Australia). Dept. of Mechanical Engineering.

ENERGY RESOURCES AND USAGE

D. W. George Feb. 1973 23 p refs Presented at Maximum Utilization of Ind. Energy Conf., Sydney, 21 Feb. 1973

(ER-2; Conf-730223-1) Avail: AEC Depository Libraries HC $3.25

The overall picture shows that Australia faces no foreseeable energy problems. Such an assumption ignores many technological and environmental problems associated with the inefficient or thoughtless use of invaluable energy resources. Issues such as Lake Pedder, the Clutha controversy, and the forthcoming public inquiry into environmental aspects of the proposed Mooba-Sydney natural gas pipeline give an indication of the pattern of the future, and an informed public interest in such matters should be welcomed by all concerned. National planning and coordination are correlated with technological advances for the optimum decisions to be made involving energy. NSA

N74-27537# Oak Ridge National Lab., Tenn.

NSF-RANN ENERGY ABSTRACTS: A MONTHLY ABSTRACT JOURNAL OF ENERGY RESEARCH, VOLUME 1, NO. 11, NOVEMBER 1973

M. P. Guthrie Nov. 1973 25 p refs Sponsored in part by NSF

(Contract W-7405-eng-26)

(ORNL-EIS-73-52(Vol-1)(No.11)) Avail: NTIS HC $3.25

The bibliography contains 91 abstracts on energy sources, electric power (generation, supply and demand, transmission, environmental effects, and use), and energy (production, consumption, supply and demand, and policy). The research publications cited are technical journal articles, popular or semi-technical magazine articles, topical reports, progress reports, symposium papers and proceedings, monographs, and books published within the past two years. NSA

N74-27538# National Center for Energy Management and Power, Philadelphia, Pa.
REVIEW AND EVALUATION OF WORK PERFORMED ON ORGANIC SEMICONDUCTOR SOLAR CELLS Final Report, 1 Jul. 1972 - 30 Jun. 1973
Gerald T. Noel 31 Jul. 1973 69 p refs
(Contract F19628-72-C-0270; AF Proj. 8659)
(AD-777139; AFCRL-TR-73-0699) Avail: NTIS CSCL 20/12

The report reviews experimental and theoretical studies related to the photovoltaic effect in organic semiconductors. Processes relevant to the operation and performance of organic solar cells are outlined and discussed in the context of a block diagram type model of an organic photovoltaic device. A detailed discussion of the impact of photon absorption and carrier generation processes on the ultimate performance of solar cells using organic semiconductor materials is presented. Author (GRA)

N74-27539# Naval Electronics Lab. Center, San Diego, Calif.
SILVER/SILVER CHLORIDE ELECTRODE: CHARGING OF A POROUS STRUCTURE Final Report, Jan. - Jul. 1973
S. Szpak, A. Nedoluha, and T. Katan 8 Mar. 1974 46 p refs Prepared in cooperation with Lockheed Missiles and Space Co., Palo Alto, California
(RR0240102; NR Proj. 359-550)
(AD-777653) Avail: NTIS CSCL 07/4

Reaction profiles for the charging of porous silver electrodes in 1 N KCl are investigated. The effects of changes in the rate determining step on the reaction profile are calculated and compared with experiment for galvanostatically held superficial current densities of 2 to 25m A/sq cm for 2 to 8 hours. Interpretations are given for the experimentally determined distributions of anodically formed silver chloride and for the morphology of the silver chloride deposits as observed with the scanning electron microscope as a function of distance into the porous structure. Author (GRA)

N74-27540# Boeing Aerospace Co., Seattle, Wash.
GROSS VOIDED FLAME ARRESTERS FOR FUEL TANK EXPLOSION PROTECTION Final Report, 1 May 1972 - 30 Oct. 1973
Terence Dixon Feb. 1974 522 p refs
(Contract F33615-72-C-1597; AF Proj. 3048)
(AD-777898; AFAPL-TR-73-124) Avail: NTIS CSCL 13/4

In this research test program, new materials were investigated for use as flame arresters within gross voided aircraft fuel tankages. The program was developed to reduce the present weight penalties associated with fully packed (10% to 15% voided) fuel tanks, using reticulated polyurethane foam. Previous work demonstrated a low-density, 25-pore-per-inch (PPI) foam explosion suppression system with 80% to 90% voiding when the source was spark ignition. The ignition sources varied throughout the total program and included a spark, incendiary igniter (developed by AFAPL/SFH) and .50 caliber API gunfire. (Modified author abstract) GRA

N74-27541# Aerojet Liquid Rocket Co., Sacramento, Calif.
DEVELOPMENT AND EVALUATION OF A STIRLING CYCLE ENERGY CONVERSION SYSTEM Annual Report, May 1972 - Jul. 1973
S. Andrus, R. J. Faeser, J. Moise, L. O. Hoffman, M. I. Rudnicki, H. K. Saito, A. Smith, and W. Carriker Nov. 1973 148 p
(Contract He-73-2930)
(PB-226617/9; PH-43-68-1435-6) Avail: NTIS HC $4.50 CSCL 06L

The Stirling cycle engine is designed to power implantable heart assist and total heart replacement systems. Heat is provided by a PU-238 radioisotope capsule. Program activity during the report period included development in vivo testing of the heart assist system including the PAC-4 actuator and the Mk V engine: design of an advanced actuator, PAC-5: and design, fabrication and testing of the THA-1 total heart actuator. GRA

N74-27542# Army Land Warfare Lab., Aberdeen Proving Ground, Md.
EMERGENCY ARCTIC BATTERY Final Report
Curtis L. Paxton Mar. 1974 27 p refs
(AD-778198; LWL-TR-74-56) Avail: NTIS CSCL 10/3

The report describes the development and testing of thermal type battery systems for the AN/PRC-77 and AN/PRC-74 radio sets. They were designed as emergency power sources for the radio systems when operating under adverse arctic weather conditions at temperatures as low as -65F where standard radio batteries are inadequate. Test results indicate that the batteries meet or exceed all important performance requirements under arctic weather conditions in Alaska. Author (GRA)

N74-27543# Stanford Research Inst., Menlo Park, Calif.
POLLUTION-FREE ELECTROCHEMICAL POWER GENERATION FROM LOW GRADE COAL
D. F. McMillen, R. D. Weaver, and M. Anbar Aug. 1973 50 p refs
(Grant NSF GI-34027)
(PB-228006/3; NSF-RA/N-73-0108) Avail: NTIS HC $3.25 CSCL 07D

Results are described of a study, exploring the feasibility of a nonpolluting, combined chemical-electrochemical system for generating electrical power. The process entails the use of coal to reduce lead oxide to a lead in a molten carbonate medium. The lead contained in the molten carbonate is then used in a metal air electrochemical cell to generate electrical power. To date it has been demonstrated that: Reduction of lead oxide by solid petroleum coke in a molten sodium-lithium-potassium carbonate eutectic is a two-step process whose overall rate is generally limited by the rate of reaction of solid carbon with CO2. The rate of this latter reaction, in turn, is directly proportional to the external surface area of the coke. (Modified author abstract) GRA

N74-27544# Atomics International, Canoga Park, Calif.
NEW CATHODE MATERIAL FOR HIGH ENERGY DENSITY BATTERIES Final Report, 1 Sep. 1972 - 30 Jun. 1973
Margie M. Nicholson 31 Jul. 1973 44 p refs
(Contract F19628-72-C-0147; AF Proj. 8659)
(AD-777857; AI-73-51; AFCRL-TR-73-0568) Avail: NTIS CSCL 10/3

The evaluation of semiconductive metal fluorides as cathode materials for lithium batteries containing organic electrolytes was continued. N-type cadmium fluoride in single-crystal form was tested. Cathodic discharge measurements were made on miniature porous electrodes containing several different n-type CdF2 powder preparations with cadmium or indium amalgam as a conductive additive. Some fabrication procedures that may lead to the desired improvement can be suggested as a result of this preliminary study. These methods include metal vapor plating to provide good electronic contacts and electrode formation. The preparation of semiconductive transition metal fluorides by incorporating an excess of the corresponding metal into the fluoride crystal structure was also investigated. The fundamental basis of this approach is discussed in some detail, and the results of initial experiments on MnF2 and NiF2 are reported. Some indications of successful doping were obtained, but further work will be required to evaluate this approach. (Modified author abstract) GRA

N74-28030 American Petroleum Inst., New York.
FUTURE ENERGY SUPPLY: APPROACHES AND OPTIONS
Wilson M. Laird *In* Bur. of Mines Technol. and Use of Lignite 1972 p 105-111 (For availability see N74-28020 17-18)

04 BIOSCIENCES

Includes aerospace medicine, exobiology, radiation effects on biological systems; physiological and psychological factors. For related information see also: 05 Biotechnology.

N74-27545# Royal Aircraft Establishment, Farnborough (England).
TO WHAT EXTENT IS THE GLYCOLYSIS IN MAMMALIAN ERYTHROCYTES CARRIED OUT VIA 2,3 DIPHOSPHOGLYCERIC ACID? ABOUT A VARIANT OF THE GLYCOLYTIC CYCLE ON THE LEVEL OF PHOSPHOGLYCERIC ACIDS
S. Rapoport and C. Nieradt Sep. 1973 12 p refs Transl. into ENGLISH from Biochem. Z. (Heidelberg), v. 326, 1955

p 231-236
(RAE-Lib-Trans-1724; BR37512) Avail: NTIS HC $4.00

From the analysis of the ratios of 3-PGS to 2,3-PGS in rabbit erythrocytes it was found, in agreement with the results of experiments with C-14, that the predominant proportion of the flucose carbon in glycolysis is transferred via 2,3-PGS. A model of the variant of the glycolytic cycle which plays a predominant part in the erythrocyte at the level of the phosphoglyceric acids is established and its biological significance is discussed. Author

N74-27546# Royal Aircraft Establishment, Farnborough (England).
DETERMINATION OF THE ZONE OF THERMAL NEUTRALITY IN WATER
C. Boutelier, J. Colin, and J. Timbal Aug. 1973 14 p refs Transl. into ENGLISH from Rev. Med. Aeronaut. Spatiale (France), v. 10, no. 37, 1971 p 25-29
(RAE-Lib-Trans-1704) Avail: NTIS HC $4.00

The zone of thermal neutrality in turbulent water for a naked resting man is specified. It extends between 33.3 and 32.9 C and differs distinctly from that found by other authors, which they located between 35 and 36 C. This zone may appear narrow, but it must be remembered that the heat exchange coefficient in water is higher than that for air in motion. Author

N74-27547*# Techtran Corp., Glen Burnie, Md.
EFFECT OF CORIOLIS ACCELERATION ACCUMULATION ON CATECHOLAMINE EXCRETION
N. S. Nemchenko Washington NASA Jun. 1974 6 p Transl. into ENGLISH from Voyenno-Med. Zh. (USSR), no. 4, Apr. 1974, p 55-56
(Contract NASw-2485)
(NASA-TT-F-15736) Avail: NTIS HC $4.00 CSCL 06P

The physiological level of catecholamine excretion in healthy persons was investigated and to determine the functional state of the sympathetic adrenal system on the basis of sensitivity to motion sickness created by application of accumulated coriolis accelerations. A clear-cut relationship was found to exist between catecholamine excretion and the application of such accelerations. Tolerance to application of the effect was improved by administration of an adrenalin solution prior to repeated exposure to the accelerations in the group of subjects moderately affected by vestibular-vegetative reactions. Author

N74-27548*# Techtran Corp., Glen Burnie, Md.
NITROGEN METABOLISM IN ERYTHROCYTE MATURATION; RESIDUAL NITROGEN FORMATION AND HEMOGLOBIN SYNTHESIS
H. G. Schweiger, S. Rapoport, and F. Schoelzel Washington NASA Jun. 1974 14 p refs Transl. into ENGLISH from Z. Physiol. Chem. (West Germany), V. 306, 1956 p 33-41
(Contract NASw-2485)
(NASA-TT-F-15741) Avail: NTIS HC $4.00 CSCL 06P

The residual nitrogen of rabbit reticulocytes was reported which increases during incubation in nutrient free medium and which does not occur with mature erythrocytes. The increase in residual nitrogen is reduced by the addition of glucose and 11 amino acids while at the same time an increase in the hemoglobin is observed. An optimum effect is achieved with large phosphate concentrations. The residual nitrogen formation is inhibited by 2.4 dinitrophenol. The source of the residual nitrogen is the reticulocytes stroma. Author

N74-27549*# Techtran Corp., Glen Burnie, Md.
TOLERANCE TO ROTATION WITH CONTINUOUS AND INTERMITTENT HEAD MOVEMENTS
F. A. Solodovnik Washington NASA Jun. 1974 6 p ref Transl. into ENGLISH from Voyenno-Med. Zh. (USSR), no. 4, Apr. 1974 p 53-55
(Contract NASw-2485)
(NASA-TT-F-15753) Avail: NTIS HC $4.00 CSCL 06S

Vestibular tolerance to two-side head movements while rotating in a Barany chair was measured in 12 male subjects not subjected to vestibular conditioning for 6 months prior to the experiment. Continuous and intermittent head movements (at intervals of 5 sec) were tested. Continuous head movement was better tolerated, but an illusion of rocking back and forth in the sajittal plane occurred which was absent during intermittent head movement. Continuous stimulation of specific cerebral cortex areas possibly inhibits development of vestibular-vegetative reactions and thus increases tolerance. Author

N74-27550*# California Univ., Irvine. Toxic Hazards Research Unit.
A STUDY OF THE BIOLOGICAL EFFECT OF CONTINUOUS INHALATION EXPOSURE OF 1, 1, 1-TRICHLOROETHENE (METHYL CHLOROFORM) ON ANIMALS Final Report
J. D. MacEwen, E. R. Kinkead, and C. C. Haun [1974] 57 p
(NASA Order T-9035)
(NASA-CR-134323) Avail: NTIS HC $6.00 CSCL 06I

The effects of continuous exposure to 1,1,1-trichloroethane on hepatic morphology and function are evaluated and compared with those produced by methylene chloride (dichloromethane) to determine environmental concentrations of each compound that would produce a similar biological response, i.e., a comparable increase in liver triglycerides over control levels. Experimental findings on mice, rats, dogs, and monkeys indicate that the pathological alternations observed with 1,1,1-trichloroethane are similar to those observed with dichloromethane except for different time courses of the effects and different degrees of recovery. A ten fold greater atmospheric concentration of 1,1,1-trichloroethane is required to produce the minimal liver changes found at 100 ppm dichloromethane. Author

N74-27551# Translation Consultants, Ltd., Arlington, Va.
STUDIES ON ROOM OZONIZERS AND ON OZONE OCCURRENCE IN THE OUTSIDE AIR AND IN INDUSTRIAL PLANTS
H. U. Wanner and A. Gilgen 1974 25 p refs Transl. into ENGLISH from Arch. Hyg. Bakteriol. (Munich), v. 15, no. 1, 2, 1966 p 78-91 Sponsored by EPA
(APTIC-07834; TR-162-74) Avail: NTIS HC $4.25

Ozone in concentrations above 0,05 ppm. causes headaches, nausea and respiratory troubles. On the basis of numerous toxicological investigations the MAC value (maximum allowable concentration) for ozone has been fixed temporarily at 0,05 ppm. The ozone concentrations measured in the atmosphere vary between 0,02 and 0,05 ppm. In industry generators, electrofilters and projection cameras have been shown to cause ozone concentrations from 0,01 to 0,1 ppm. Ozonizers bring about concentrations between 0,02 and 0,03 ppm. Although it is often recommended, the use of ozonizers in rooms is to be rejected as no evidence of favorable effects could be found for concentrations within the limits of human tolerance; in addition, an increase in the ozone concentration is not perceivable and therefore health may be negatively affected. Author

N74-27552# Scientific Translation Service, Santa Barbara, Calif.
DISEASES DUE TO POLLUTIONS
O. Wada 1974 19 p refs Transl. into ENGLISH from Tokyo Med. School (Tokyo), v. 25, no. 4, 1972 p 413-420 Sponsored by EPA
(APTIC-41124; TR-131-74) Avail: NTIS HC $4.00

An explanation is given of role played by clinical physicians in understanding the problems and diseases caused by air pollution. The treatment of such problems is also discussed. Postindustrial age diseases and problems are analyzed. E.H.W.

N74-27553# Translation Consultants, Ltd., Arlington, Va.
THE CHRONIC EFFECTS OF NITROGEN DIOXIDE
Taichi Nakajima and Shigeo Kusumoto 1974 4 p Transl. into ENGLISH from Taiki Osen Kenkyu (Tokyo), v. 6, no. 1, 1971 p 144 Sponsored by EPA
(APTIC-40168; TR-76-74) Avail: NTIS HC $4.00

In order to investigate the chronic effects of nitrogen dioxide, a histopathological examination was made of mice who had been exposed to low concentrations of NO2 gas for 24 hours/day, 7 days/week for more than one month. In addition, measurements were made of the quantity of reduced glutathione in the lung tissues. Histopathological effects were observed in the respiratory organs. Author

N74-27554# Environmental Protection Agency, Research Triangle Park, N.C. Technical Information Center.
CONCERNING THE EFFECTS OF AIR POLLUTION ON THE

HUMAN ORGANISM IN THE YOKKAICHI REGION
Oshima Hidehiko and Imai Masayuki 1974 4 p Transl. into ENGLISH from Nippon Koshu Eisei Zasshi (Japan), v. 19, no. 10, Oct. 1972 p 382
(APTIC-47896; TR-142-74) Avail: NTIS HC $4.00

A series of epidemiological survey studies was performed beginning from fiscal year 1961 for the purpose of determining the effects of air pollution in Yokkaichi upon the human organism. The connection between obstructive respiratory diseases and air pollution was analyzed a strong correlation between chronic bronchitis and pulmonary emphysema and the sulfurous acid gas was obtained, pulmonary emphysema increased as a result of the prolongation of the pollution. Author

N74-27555*# Techtran Corp., Glen Burnie, Md.
PROTEOLYTIC ENZYMES AND PROTEIN METABOLISM IN RABBIT ERYTHROCYTES DURING CELL MATURATION IN VIVO
R. J. Haschen, W. Farr, and F. Groh Washinton NASA Jun. 1974 14 p refs Transl. into ENGLISH from Acta Biol. Med. Ger. (Berlin), v. 14, 1965 p 205-215
(Contract NASw-2485)
(NASA-TM-X-15731) Avail: NTIS HC $4.00 CSCL 06D

The haemolysate of erythrocytes of rabbits treated and not treated with phenylhydrazine analysed acid proteinase, cathepsin A, 6 exopeptidases, asparatate-amino-transferase, and total N, stroma-N, Hb-N, NPN and amino-N. The enzymes behave differently during the process of maturation: (1) Cathepsine A rapidly disappears; (2) the acid proteinase, glycyl-glycine-, glycyl-leucine- and imino-dipeptidase, as well the aspartat-aminotransferase show a marked decrease, while leucine-aminopeptidase is slightly decreased; and (3) the activities of aminotripeptidase and imino-dipeptidase remain unchanged. The time sequence of these changes was specified more precisely by serial determinations during cellular regeneration and maturation. Author

N74-27556*# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Pathology Branch.
HEPATIC PATHOLOGY IN MICE AFTER CONTINUOUS INHALATION EXPOSURE TO 1, 1, 1-TRICHLOROETHANE Final Report
Neil S. McNutt, Robert L. Master, Ernest E. McConnell, and Fred Morris [1974] 46 p refs
(NASA Order T-9035-B)
(NASA-CR-134322) Avail: NTIS HC $5.50 CSCL 06P

Mice exposed to either 250ppm or 1,000ppm 1,1,1-trichloroethane in air continuously for 14 weeks demonstrated significant changes in the centrilobular hepatocytes for the 1,000ppm group. Moderate liver triglyceride accumulation was evident in the 1,000ppm group and peaked at 40mg/gm of tissue after 7 weeks of exposure. Focal hepatocyte necrosis occurred in 40% of the mice exposed to 1,000ppm for 12 weeks. This necrosis was associated with an acute inflammatory infiltrate and hypertrophy of Kupffer cells. These findings indicate that the pathological alternations observed with 1,1,1-trichloroethane are similar to those observed with dichloromethane except for different time courses of the effects and different degrees of recovery. The toxic effects of 1,1,1-trichloroethane are of a similar type to those produced by carbon tetrachloride but appear much less severe. Author.

N74-27557*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PERIPHERAL VISUAL RESPONSE TIME TO COLORED STIMULI IMAGED ON THE HORIZONTAL MERIDIAN
Richard F. Haines, Madeleine M. Gross (San Jose State Univ., Calif.), David Nylen (San Jose State Univ., Calif.), and L. Markham Dawson (San Jose State Univ., Calif.) Washington Jun. 1974 18 p refs
(NASA-TM-X-3086; A-5435) Avail: NTIS HC $3.00 CSCL 06P

Two male observers were administered a binocular visual response time task to small (45 min arc), flashed, photopic stimuli at four dominant wavelengths (632 nm red; 583 nm yellow; 526 nm green; 464 nm blue) imaged across the horizontal retinal meridian. The stimuli were imaged at 10 deg arc intervals from 80 deg left to 90 deg right of fixation. Testing followed either prior light adaptation or prior dark adaptation. Results indicated that mean response time (RT) varies with stimulus color. RT is faster to yellow than to blue and green and slowest to red. In general, mean RT was found to increase from fovea to periphery for all four colors, with the curve for red stimuli exhibiting the most rapid positive acceleration with increasing angular eccentricity from the fovea. The shape of the RT distribution across the retina was also found to depend upon the state of light or dark adaptation. The findings are related to previous RT research and are discussed in terms of optimizing the color and position of colored displays on instrument panels. Author

N74-27558# State Univ. of New York, Buffalo. Dept. of Physiology.
HYPOXIA AND TISSUE GAS EXCHANGE Final Report
Leon E. Farhi 14 Sep. 1973 12 p refs
(Contract F44620-73-C-0035; AF Proj. 9777)
(AD-777158; AFOSR-73-2329TR) Avail: NTIS CSCL 06/19

The primary purpose of the present study was to elucidate the effects of perfusion, solubility and diffusivity on inert gas tissue washout patterns. The motivation for this work was a preliminary study in this laboratory in which inert gas washouts using two gases having similar blood tissue partition coefficients but different diffusivities were performed. Because no significant differences in the washout curves of the two gases were noted it was concluded that inert gas washout is perfusion rather than diffusion limited. It was hoped that the analysis described would suggest the magnitude of the diffusivity differences that are required to produce differences in the washout curves. Obtained data indicate that gas pairs with diffusivity ratios of one to three could be used to assess the importance of diffusion limitation when tissue hypoxia exists. (Modified author abstract) GRA

N74-27559# School of Aerospace Medicine, Brooks AFB, Tex.
PHYSIOLOGIC RESPONSES TO HIGH SUSTAINED PLUSGz ACCELERATION Final Technical Report, 6 Jun. - 6 Jul. 1972
Sidney D. Leverett, Jr., Russell R. Burton, Roger J. Crossley, Edward D. Michaelson, and Samuel J. Shubrooks, Jr. Dec. 1973 74 p refs
(AF Proj. 7930)
(AD-777604; SAM-TR-73-21) Avail: NTIS CSCL 06/19

The study investigated several physiological effects of accelerations, up to 8 G for one min., and compared the RAF mini-suit with a standard full-length suit. Positive pressure breathing and forced expiration through a partially closed glottis were studied as methods of increasing tolerance to high sustained +Gz accelerations. GRA

N74-27560# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DETECTION OF THE K-COMPLEX IN HUMAN EEG SLEEP RECORDS M.S. Thesis
Paul R. Marlin Mar. 1974 94 p refs
(AD-777243; GE/BE/74-12) Avail: NTIS CSCL 06/16

The paper presents the development of a computer algorithm for the detection of K-complexes in the normal human sleep electroencephalogram (EEG). The detection scheme applies time and frequency domain pattern recognition techniques to a single channel (central area recording site) of digitized EEG data to identify waveforms as K-complexes. The detection of K-complexes resulted in an accuracy of 62.5% (7.3% miss error and 30.2% false detections). The primary source of false detections was the identification of Delta wave activity as K-complexes. The detection scheme is also used for scoring sleep EEG data as K-complex (Stage 2) or non-K-complex (Stages 1 and REM) sleep stages. Results of the sleep scoring effort provide an accuracy of 94% when compared to the usually scored EEG. Author (GRA)

N74-27561# Indiana Univ., Bloomington. Dept. of Anatomy and Physiology.
PHYSIOLOGICAL ADJUSTMENTS TO ENVIRONMENTAL FACTORS
Howard H. Rostorfer 31 Aug. 1973 49 p refs
(Grant AF-AFOSR-2383-72; AF Proj. 9777)
(AD-777290; AFOSR-73-2335TR) Avail: NTIS CSCL 06/19

The report summarizes investigations in the following

areas--temperature regulation in primates, mathematical modeling of pulmonary compliance and resistance, regulation of blood glucose in man during exercise, and microvascular blood flow dynamics in skeletal muscle. Data gathered during the period indicate that physiological control of evaporative heat loss due to sweating in the resting rhesus monkey is similar to that found in resting man. Experimental evidence to date indicates the rhesus can serve as an adequate thermoregulatory model for experiments which cannot be performed on man. A least squares parameter identification has been used to assess nonlinear aspects of the mechanical properties of isolated lung and to study the affects of chronic elevated carbon dioxide for two months was insufficient to induce pulmonary damage suggesting that either higher concentration or longer exposure times are needed to induce significant changes. (Modified author abstract) GRA

N74-27562# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.
FLASHBLINDNESS FOLLOWING DOUBLE FLASH EXPOSURES
Gloria T. Chisum and Phyllis E. Morway 5 Apr. 1974 14 p refs
(AD-777698; NADC-74015-40) Avail: NTIS CSCL 06/5

Times required to detect a simple display were measured following exposure to adapting flashes separated by varying intervals ranging from 2 to 90 seconds. The results indicate that for flash durations of 165 microseconds, the approximate exposure duration wherein protection equipment is used, there are no consistent variations in response times as a function of interflash interval. Author (GRA)

N74-27563# Bureau of Radiological Health, Rockville, Md.
A REVIEW OF SELECTED BIOEFFECTS THRESHOLDS FOR VARIOUS SPECTRAL RANGES OF LIGHT
W. F. VanPelt, W. R. Payne, and R. W. Peterson Jun. 1973 70 p refs
(PB-228391/9; DHEW/FDA-74-8010) Avail: NTIS MF $1.45, SOD HC $1.25 as SN.1715-00063 CSCL 06R

The development and administration of programs to evaluate and control those emissions from electronic products which represent potential hazards to health was discussed. An important part of this program is the identification and understanding of the biological effects of a particular type of emission. One class of such emissions is electromagnetic energy in the infrared, visible, and ultraviolet wavelength regions emitted by lasers and other high intensity light sources. This survey and interpretation of the scientific literature on the biological effects of light was undertaken to serve as a working reference in the establishment of safety guidelines for light sources. Author (GRA)

N74-27564# School of Aerospace Medicine, Brooks AFB, Tex.
DEVELOPMENT OF AN ELECTRONIC NEBULIZED-HUMIDIFIER Final Report, Jul. 1968 - Jul. 1973
Jeanne L. Curtis Apr. 1974 9 p
(AF Proj. 4054)
(AD-778082; SAM-TR-74-8) Avail: NTIS CSCL 06/12

The electronic nebulizer-humidifier was designed to provide medical equipment capable of administering therapeutic humidification to patients in aeromedical aircraft. Specifications required the item to be compact, portable, lightweight, durable, and operationally compatible with both dedicated aircraft such as the C-9 and multimission aircraft such as the C-130 and C-141. In the airborne environment the unit must be capable of producing fine mist droplets (0.5 to 8 microns in diameter) to humidify and deliver moisture to the upper and lower pulmonary airways. The volume of water, as aerosol, delivered must be adjustable within a range of .5 to 3.5 ml per minute. The nebulizer-humidifier must be easily secured to the poles of the standard (NATO) litter and be capable of providing aerosol therapy via an open face mask, face tent, tracheostomy mask, or high humidity tent. (Modified author abstract) GRA

N74-27565# Illinois Univ., Urbana. Dept. of Computer Science.
A TWO COMPARTMENTAL MODEL OF THE RESPIRATORY SYSTEM M.S. Thesis
Paul Robert Haskitt Dec. 1973 50 p refs
(PB-228669/8; UIUCDCS-R-73-616) Avail: NTIS HC $5.50 CSCL 06P

A simplified two compartmental model of the human respiratory system is presented. The model is used to study the steady state responses to hypoxia at altitude and sea level, carbon dioxide inhalation, and metabolic disturbances, and the transient response to metabolic disturbances. GRA

05 BIOTECHNOLOGY

Includes life support systems, human engineering; protective clothing and equipment; crew training and evaluation, and piloting. For related information see also: 04 Biosciences.

N74-27566* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ARTERIAL PULSE WAVE PRESSURE TRANSDUCER Patent
Chung Kim (George Washington Univ., Washington, D. C.), Donald Gorelick (George Washington Univ., Washington, D. C.), and Wayne Chen, inventors (to NASA) (George Washington Univ., Washington, D. C.) Issued 21 May 1974 5 p Filed 25 Sep. 1972 Supersedes N73-11097 (11 - 02, p 0135) Sponsored by NASA
(NASA-Case-GSC-11531-1; US-Patent-3,811,429; US-Patent-Appl-SN-291845; US-Patent-Class-128-2.05E; US-Patent-Class-73-398AR) Avail: US Patent Office CSCL 06B

An arterial pulse wave pressure transducer is introduced. The transducer is comprised of a fluid filled cavity having a flexible membrane disposed over the cavity and adapted to be placed on the skin over an artery. An arterial pulse wave creates pressure pulses in the fluid which are transduced, by a pressure sensitive transistor in direct contact with the fluid, into an electric signal. The electrical signal is representative of the pulse waves and can be recorded so as to monitor changes in the elasticity of the arterial walls. Official Gazette of the U.S. Patent Office

N74-27567 Rensselaer Polytechnic Inst., Troy, N.Y.
STEP SIZE IN THE MUNSELL COLOR ORDER SYSTEM Ph.D. Thesis
Robert Toby Marcus 1974 277 p
Avail: Univ. Microfilms Order No. 74-12787

The effects were studied of fractioning down color differences of the size of those between adjacent samples in the Munsell color order system to those with sizes in the range of commercial tolerances. Spectrophotometric measurements on a set of samples in the near gray region of color space extended from a neutral series along five constant hue lines: 10YR, 2.5Y, 5Y, 7.5Y and 10Y. A high degree of linearity between the visual scale and the measured renotation coordinates for both chroma and value, leading to the preliminary conclusion that in the near gray region of color space, the Munsell color order system does indeed retain its characteristics of perceptual uniformity when fractionated to the range of quarter step increments in value and chroma. Dissert. Abstr.

N74-27568*# Rancho Los Amigos Hospital, Inc., Downey, Calif.
DESIGN AND FABRICATE A PAIR OF RANCHO ANTHROPOMORPHIC MANIPULATOR ARMS Final Report, 17 Feb. 1972 - 31 Dec. 1972
James R. Allen, Andrew Karchak, Jr., and Ernest L. Bontrager 31 Dec. 1972 30 p
(Contract NAS8-28361)
(NASA-CR-120275) Avail: NTIS HC $4.50 CSCL 05H

The basic design features of the Rancho Anthropomorphic Manipulator (RAM), bilateral manipulator system are reported. In contrast with other previous electrically powered manipulators, the RAM features increased payload capability, structural integrity, position control, and the ability to interchange its own terminal devices. A set of detailed design drawings and a motion picture are considered. Author

N74-27569# Royal Aircraft Establishment, Farnborough (England).
CONTRIBUTION TO THE OPTIMISATION OF THE OSCIL-

LATORY PROPERTIES OF A VEHICLE: PHYSIOLOGICAL FOUNDATIONS OF COMFORT DURING OSCILLATIONS
Dusan Simic Feb. 1974 124 p refs Transl. into ENGLISH from the German report D-38
(RAE-Lib-Trans-1707; BR39871; D-38) Avail: NTIS HC $9.25

Throughout the laboratory vibration tests, a car seat was used with an electrophydraulic vibrator with a frequency range between 0.1 and 50 Hz. Initially, reaction of some 10 male subjects to vertical (nominally sinusoidal) vibration was explored, covering thresholds of perception and curves of equal perception strength. The latter were obtained by subjective estimation of acceptable exposure times from 10 minutes to 8 hours, and in the idealized form finally presented, show an increase in g from 0.2 Hz to 1 Hz, then level to 2.5Hz, falling to a trough between 5 and 20 Hz. In the second series of tests, reaction to pitching oscillation was investigated using the vibrator linked to a variable lever system so that the amount of pure rotation and translation could be varied. Thresholds of perception, and equal perception strength for various estimated times, were again obtained, and are similar in shape to those for purely vertical excitation up to about 3 Hz, but then rise to a plateau from about 10 to 30 Hz. The final tests were made to explore the theory that tolerance of humans to externally applied vertical vibrations is closely linked with the self-induced accelerations and frequencies which occur during motion on foot. Author

N74-27570*# SCI Systems, Inc., Houston, Tex.
BIOMEDICAL ENGINEERING TASKS Final Report, 1 Mar. - 30 Nov. 1972
Dec. 1972 108 p
(Contract NAS9-12597)
(NASA-CR-128733) Avail: NTIS HC $8.50 CSCL 06B

Electrocardiographic and vectorcardiographic bioinstrumentation work centered on the development of a new electrode system harness for Project Skylab. Evaluation of several silver electrode configurations proved superior impedance voltage performance for silver/silver chloride electrodes mounted flush by using a paste adhesive. A portable ECG processor has been designed and a breadboard unit has been built to sample ECG input data at a rate of 500 samples per second for arrhythmia detection. A small real time display driver program has been developed for statistical analysis on selected QPS features. Engineering work on a sleep monitoring cap assembly continued. G.G.

N74-27571*# Stanford Research Inst., Menlo Park, Calif.
STUDY TO DESIGN AND DEVELOP REMOTE MANIPULATOR SYSTEM Final Report, 1 May 1973 - 30 Apr. 1974
J. W. Hill, D. E. McGovern, and A. J. Sword May 1974 208 p refs
(Contract NAS2-7507; SRI Proj. 2583)
(NASA-CR-137528) Avail: NTIS HC $13.50 CSCL 05H

Modeling of human performance in remote manipulation tasks is reported by automated procedures using computers to analyze and count motions during a manipulation task. Performance is monitored by an on-line computer capable of measuring the joint angles of both master and slave and in some cases the trajectory and velocity of the hand itself. In this way the operator's strategies with different transmission delays, displays, tasks, and manipulators can be analyzed in detail for comparison. Some progress is described in obtaining a set of standard tasks and difficulty measures for evaluating manipulator performance. Author

N74-27572*# Fairchild Republic Div., Farmingdale, N.Y.
DEVELOPMENT TESTING OF A SHUTTLE URINE COLLECTION SYSTEM
Dec. 1973 29 p
(Contract NAS9-13694)
(NASA-CR-134337; RD008T1001) Avail: NTIS HC $4.50 CSCL 06I

Flight tests conducted in December 1973 demonstrated the ability of an unisexual urine collection subsystem to function in a zero-g environment. The urinal, which could be adjusted with three degrees of freedom, accommmodated 16 female test subjects with a wide range of stature, as well as five male test subjects. The urinal was in intimate contact with the female and was contoured to form an effective air seal at the periphery. When positioned 2-4 inches forward, the urinal could be used for male collection and contact was not required. Author

N74-27573*# California Univ., San Diego. Dept. of Neurosciences.
VERTEX EVOKED POTENTIALS IN A RATING-SCALE DETECTION TASK: RELATION TO SIGNAL PROBABILITY
Kenneth C. Squires, Nancy K. Squires, and Steven A. Hillyard [1974] 33 p refs
(Grants NGR-05-009-083)
(NASA-CR-138796) Avail: NTIS HC $4.75 CSCL 05E

Vertex evoked potentials were recorded from human subjects performing in an auditory detection task with rating scale responses. Three values of a priori probability of signal presentation were tested. The amplitudes of the N1 and P3 components of the vertex potential associated with correct detections of the signal were found to be systematically related to the strictness of the response criterion and independent of variations in a priori signal probability. No similar evoked potential components were found associated with signal absent judgements (misses and correct rejections) regardless of the confidence level of the judgement or signal probability. These results strongly support the contention that the form of the vertex evoked response is closely correlated with the subject's psychophysical decision regarding the presence or absence of a threshold level signal. Author

N74-27574*# Kanner (Leo) Associates, Redwood City, Calif.
CARDIAC RHYTHM COMPUTER ANALYSIS TECHNIQUES
V. V. Syrotskyy, O. P. Vetrov, and V. V. Garbovskyy Washington NASA Jun. 1974 9 p refs Transl. into ENGLISH from Fiziol. Zh. (USSR), v. 20, no. 2, Mar. - Apr. 1974 P. 254-257
(Contract NASw-2481)
(NASA-TT-F-15733) Avail: NTIS HC $4.00 CSCL 06B

Variational pulsometry, in conjunction with computerized data input, permits the utilization of quantiative criteria and statistical parameters of refine diagnostic science. The most sensitive parameters of cardiac rhythm were found to be strain, the coefficient of variation, and the percentage of dominance of sympathetic effects. Author

N74-27575*# General American Transportation Corp., Niles, Ill. General American Research Div.
DEVELOPMENT OF INTEGRATED, ZERO-g PNEUMATIC TRANSPORTER/ROTATING PADDLE INCINERATOR/CATALYTIC AFTERBURNER SUBSYSTEM FOR PROCESSING HUMAN WASTES ON BOARD SPACECRAFT Component Performance Summary Report
S. F. Fields, L. J. Labak, and R. J. Honegger Apr. 1974 86 p
(Contract NAS2-6386)
(NASA-CR-114763) Avail: NTIS HC $7.50 CSCL 06I

A four component system was developed which consists of a particle size reduction mechanism, a pneumatic waste transport system, a rotating-paddle incinerator, and a catalytic afterburner to be integrated into a six-man, zero-g subsystem for processing human wastes on board spacecraft. The study included the development of different concepts or functions, the establishment of operational specifications, and a critical evaluation for each of the four components. A series of laboratory tests was run, and a baseline subsystem design was established. An operational specification was also written in preparation for detailed design and testing of this baseline subsystem. Author

N74-27576# Toronto Univ. (Ontario). Inst. of Aerospace Studies.
EFFECTS OF SONIC BOOM ON AUTOMOBILE-DRIVER BEHAVIOUR
Orest Volodymyr Nowakiwsky Jun. 1974 59 p refs Sponsored by Transportation Dev. Agency, Min. of Transport, and Natl. Res. Council of Can.
(UTIAS-TN-188) Avail: NTIS HC $6.00

Test results are presented on the response and behavior of automobile drivers subjected to sonic boom disturbances under actual driving conditions. The design and development of a portable sonic boom simulator, auxiliary equipment, and experimental techniques are used to study the nature and severity of the disturbance effects. The sonic boom simulator consisting basically of loudspeakers and a function generator was mounted inside a

test vehicle. It was able to produce sonic booms that were very similar to what drivers would experience following SST overflights. The simulated booms had overpressures of 3 psf, rise times of about one millisecond, and durations of 100 milliseconds. Two aspects of driving were investigated the tracking manoeuver and the stopping task. Results from both tests indicated that driver behavior was not affected by the simulated booms, even though some drivers considered it annoying or disturbing. It may therefore be concluded from present limited statistical tests that current commercial supersonic aircraft under normal flight conditions (without superbooms) would not produce adverse effects on a driver's stopping distance or his ability to follow a particular course. Author

N74-27577# Vermont Univ., Burlington. Dept. of Psychology.
ISOLATION AND SENSORY COMMUNICATION Final Report, 1 Sep. 1968 - 31 Aug. 1973
Donald G. Forgays 31 Aug. 1973 80 p refs
(Contract F44620-69-C-0001; AF Proj. 9563)
(AD-777156; AFOSR-73-2320TR) Avail: NTIS CSCL 05/10

A 1968-1973 study was made of a factor common to sensory and perceptual deprivation, isolation, and confinement: a stress to the subject. Subjects indicate this influence by low tolerance for the condition, self-report, and by physiology change. Stress is also common to many military systems. The investigation was concerned with the evaluation of special training methods and additional experiences in the reduction of stress or in the more efficient adjustment to stress. The final report is composed of the summary of findings in six subject fields of experimentation. (Modified author abstract) GRA

N74-27578# School of Aerospace Medicine, Brooks AFB, Tex.
DEVELOPMENT OF A LITTER ACCESS DEVICE FOR C-141 AEROMEDICAL AIRCRAFT Final Report, Dec. 1969 - Jul. 1973
Jeanne L. Curtis Mar. 1974 8 p
(AF Proj. 4054)
(AD-777147; SAM-TR-74-7) Avail: NTIS CSCL 06/12

The litter access device (LAD) for C-141 aeromedical aircraft was designed and developed to provide a unit which would enable aeromedical personnel to have safe access to patients in upper litter spaces and which would permit able litter patients to ascend to and descend from upper litter positions in safety during aeromedical airlift. Prototypes underwent operational test and evaluation on Military Airlift Command aeromedical missions flown in C-141 aircraft. Evaluations indicated the litter access device fulfilled the functional and operational requirements. Author (GRA)

N74-27579# Army Medical Research Lab., Fort Knox, Ky.
PSYCHOLOGICAL FACTORS RELATED TO THE VOLUNTARY USE OF HEARING PROTECTION IN HAZARDOUS NOISE ENVIRONMENTS Final Report
George A. Luz, Richard A. Decatur, and Robert L. Thompson 31 Oct. 1973 14 p refs
(DA Proj. 3A1-61102-B-71R)
(AD-777520; USAMRL-1066) Avail: NTIS CSCL 05/10

The objective of this study was to determine whether social contexts had any influence on the use of ear protection in a hazardous noise environment and on attitudes toward earplugs. An Army community was scanned for situations in which persons could choose to use ear protection. Behavior was measured in three different ways: pencil and paper tests, observation, and experimental manipulation. In three different situations, the usage of earplugs was significantly related to social context. A recommendation for a more precise definition of the positive incentives for ear protection was made. Author (GRA)

N74-27580# Army Aeromedical Research Lab., Fort Rucker, Ala.
SOFT (HYDROPHILIC) CONTACT LENSES IN US ARMY AVIATION: AN INVESTIGATIVE STUDY OF THE BAUSCH AND LOMB SOFLENS
John K. Crosley, Erwin G. Braun, and Robert W. Bailey Mar. 1974 26 p refs
(AD-776353; USAARL-74-10) Avail: NTIS CSCL 06/12

The use of standard acrylic or hard contact lenses has been relatively unsuccessful in the military aviation environment, particularly when worn by personnel flying rotary wing aircraft. The purpose of this study was to evaluate the applicability of one type of hydrophilic lens to U.S. Army aviation. Nineteen volunteer helicopter pilots served as subjects and three specific areas were investigated. These were: clinical procedures, foreign body involvement, and the effect of extended (72 hours) continuous wear. The results indicate that the Soflens offers certain advantages over acrylic lenses for this specialized application. There were, however, distinct problems encountered which may be lessened with the introduction of new lens materials and aspepticizing techniques. Author (GRA)

N74-27581# Army Aeromedical Research Lab., Fort Rucker, Ala.
PRELIMINARY EVALUATION OF PORTABLE AVIATION OXYGEN SYSTEMS
Jay C. Bisgard, Roderick J. McNeil, and Frank S. Pettyjohn Jul. 1973 52 p refs
(DA Proj. 3A0-62110-A-819)
(AD-776348; USAARL-73-16) Avail: NTIS CSCL 06/11

The object was to determine the requirements for portable aviation oxygen systems during Army high altitude rescue and medical evacuation missions, and then to determine the necessity for R and D efforts by evaluating the potential of currently available system components to fulfill the identified requirements. This preliminary report is a record of USAARL's involvement in the area of Army aviation oxygen systems to include researching the background to achieve a proper direction for study, selection of promising systems for altitude chamber evaluation, study results, conclusions, and feasible recommendations. It was found that immediate Army requirements can be satisfied by currently available military and commercial oxygen system components. (Modified author abstract) GRA

N74-27582# Oei, Inc., Bedford, Mass.
JOINT ARMY NAVY AIR CREW IMPACT INJURY PREVENTION PROGRAM Annual Report, 1 Nov. 1972 - 31 Oct. 1973
Alan H. Rutan, Rodney W. Thorpe, Robert M. Martin, and Dorothy A. Francis 1 Nov. 1973 37 p refs
(Contract N00014-70-C-0082; NR Proj. 105-579)
(AD-777713; IM-1-Nov-73-1) Avail: NTIS CSCL 06/19

The report covers the mathematical analysis and computer-related efforts. The vertical acceleration data processing effort included the writing and testing of conversion and scaling programs, after which the vertical acceleration data was scaled and plotted. The two-dimensional data base, which includes both sensor and photographic variables, was completed; plots were made of all variables from all appropriate runs. The 3-D analysis continued with work being done on various configurations of six accelerometers. Further analysis was performed on 3-D photogrammetry including methods of calibration and data reduction of optical and X-ray photography. A preliminary regression analysis was performed with respect to head and neck response to impact acceleration. Various other programming efforts relating to the project were performed. (Modified author abstract) GRA

N74-27583# School of Aerospace Medicine, Brooks AFB, Tex.
PROBLEMS IN THE SELECTION OF PERSONNEL OPERATORS FOR CLOSED ECOLOGIC SYSTEMS AND PROPHYLACTIC MEASURES FOR NEUROPSYCHIC DISORDERS
O. N. Kuznetzov and V. I. Lebedev 1974 40 p Transl. into ENGLISH from the book "Psikhologiya i Psikhopatologiya Odinochestva Meditsina" Moscow, 1972
(AD-777684; SAM-TT-R-1198-0474) Avail: NTIS CSCL 06/14

Cosmonauts, flyers, pilots, submarine operators, radar workers, and a host of other types of occupational workers must perform their work in ecologically closed systems. The very nature of the work, with the exception of the possibilities for direct interpersonal contacts and the effects of numerous external environmental stimuli, intensifies man's isolation in such occupations. In emergency situations where the communication network is disturbed or the automation fails, man finds himself in a critical situation of isolation. Because of this situation, actual

problems in the selection of personnel involved in working in ecologically closed systems and the prophylactic measures for the prevention of neuropsychic disorders are of current interest. The report is devoted to this subject. GRA

N74-27584# National Highway Traffic Safety Administration, Washington, D.C.
AIR BAG RESTRAINT SYSTEMS Special Bibliography Report, 1967 - Oct. 1973
Oct. 1973 47 p refs
(PB-227749/9; DOT-HS-801-033; Rept-5) Avail: NTIS HC $3.25 CSCL 13L

The documents cited in this publication are in the NHTSA Technical Reference Division collection and can be examined there. Since this collection was established in 1967 most of the publications cited bear a publication date of 1967 or later. Citations and abstracts are those that have previously appeared in the NHTSA publication Highway Safety Literature. GRA

N74-27585# Civil Aeromedical Inst., Oklahoma City, Okla.
STUDY OF CONTROL FORCE LIMITS FOR FEMALE PILOTS
Robert C. Leeper, A. Howard Hasbrook, and Jerry L. Purswell Dec. 1973 34 p refs
(AD-777839; FAA-AM-73-23) Avail: NTIS CSCL 05/5

The study described in this paper was the second phase in a ground-based control force testing program conducted by the University of Oklahoma and the Civil Aeromedical Institute of the Federal Aviation Administration located in Oklahoma City, Oklahoma. A Convair-340 simulator, modified to conform to a typical civil aviation aircraft, was used for the study. Female pilots were used as subjects. The data show that the current FAR 23.143 control force limits for general aviation aircraft are too high for a majority of U.S. female pilots. Data on strength capabilities of women for operating aircraft controls are presented in the form of prediction equations for level of control force versus time. Author (GRA)

N74-28390* Kanner (Leo) Associates, Redwood City, Calif.
LEVEL, PECULIARITIES AND EFFECTS OF COAL MINE NOISE ON PIT WORKERS
I. G. Darlea, P. Bitir, and M. Coculescu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 170-176 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica, Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 221-228 (For availability see N74-28363 17-32)
CSCL 05E

N74-28397* Kanner (Leo) Associates, Redwood City, Calif.
SOME ASPECTS OF SOUND DISCOMFORT CAUSED BY STREETCAR TRAFFIC
C. Ursoniu, N. Puca, A. Dankner, G. Moise, and A. Sirbu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 212-217 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica, Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 277-282 (For availability see N74-28363 17-32)
CSCL 05E

N74-28398* Kanner (Leo) Associates, Redwood City, Calif.
DATA ON THE ACOUSTIC COMFORT OF PASSENGERS IN RAILROAD CARS AND SOUNDPROOFING RECOMMENDATIONS
Constantin Tomescu and Radu Vrasti *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 218-223 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica, Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 285-291 (For availability see N74-28363 17-32)
CSCL 05E

06 CHEMISTRY

Includes chemical analysis and identification (e.g. spectroscopy). For applications see: 17 Materials, Metallic; 18 Materials, Nonmetallic; and 27 Propellants.

N74-27586 Washington Univ., St. Louis, Mo.
PULSED NMR IN He SUP 3 ADSORBED ON GRAPHITE BELOW 4.2K Ph.D. Thesis
Derick Peter Grimmer 1973 217 p
Avail: Univ. Microfilms Order No. 74-13744

Pulsed nuclear magnetic resonance (NMR) experiments were performed on He3 adsorbed on graphite below 4.2K to determine in what way the adsorbed He3 monolayer behaves like a two-dimensional quantum system. The NMR measurements, particularly the nuclear magnetic susceptibility, indicate that the He3 monolayer is a mobile system exhibiting fermi degeneracy. Spin diffusion values obtained from the T sub 2 decay behavior in the bounded medium of the substrate pores support the mobile system model. The T sub 1 decay behavior is complicated, and due to He3 substrate interaction rather than the He3-He3 interaction. Dissert. Abstr.

N74-27587 Central Electricity Generating Board, London (England).
FLUE GAS ANALYSIS AND DUST AND SMOKE DETERMINATION, 1958 - 1973
D. Wills, comp. May 1974 18 p refs
(CE-Bib-41A.1) Avail: Issuing Activity

Abstracts on air sampling and analysis methods presented consider sulfur and nitrogen oxides; oxygen, carbon dioxide, and dew point; and sampling methods. G.G.

N74-27588*# Worcester Polytechnic Inst., Mass. Dept. of Chemical Engineering.
AN INTERFACED SYSTEM FOR PRODUCTION OF METHANE IN A SPACECRAFT Final Report
Alvin H. Weiss 30 Jun. 1973 37 p refs
(Grant NGR-22-017-023)
(NASA-CR-138923) Avail: NTIS HC $5.00 CSCL 07C

The formose reaction, the homogeneously catalyzed condensation of formaldehyde to sugars, proceeds simultaneously with Cannizzaro and crossed Cannizzaro reactions. Reaction studies in a continuous stirred tank reactor have shown that rate instabilities are exhibited. There are temperature instabilities as well as concentration instabilities in calcium hydroxide catalyst, formaldehyde reactent, and hydroxyl ion. It is postulated that Ca(OH)+ is the actual catalytic species for the formose system. A unifying mechanism is developed that postulates that reactions proceed from a common intermediate complexed species, and that the selectivity for each reaction depends on the nature of the catalyst forming the carbohydrate complex. The catalytic mechanism explains the Lobry de Bruyn-van Eckenstein aldose ketose rearrangements and mutarotations of sugars that also proceed in the system. Author

N74-27589# Royal Aircraft Establishment, Farnborough (England).
TWO-DIMENSIONAL THIN-LAYER CHROMATOGRAPHIC SEPARATION OF STEROIDS
W. Schink and H. Struck 1973 8 p refs Transl. into ENGLISH from Med. Welt (West Germany), v. 29, 1964 p 1525-1526
(RAE-Lib-Trans-1695; BR36947) Avail: NTIS HC $4.00

A two-dimensional thin-layer chromatographic method was described for the separation of steroids in purified organ extracts. Eighteen steroids were investigated using Merck's silica gel G plates and chloroform/acetone mixtures as chromatographic solvents. The separation of pigments from steroids was achieved with this method. Author

N74-27590# Royal Aircraft Establishment, Farnborough (England).
THIN LAYER CHROMATOGRAPHY OF CORTICOSTEROIDS. ASCENDING AND DESCENDING METHODS
Ludwig Goldel, Winfried Zimmermann, and Dietmar Lommer Jun. 1973 17 p refs Transl. into ENGLISH from Z. Physiol. Chem. (Berlin), v. 333, 1963 p 35-45

(RAE-Lib-Trans-1697; BR36226) Avail: NTIS HC $4.00

The applicability of the so-called Zaffaroni systems to Kieselgel thin layer chromatography for the analysis of corticosteroids is described. Systems are described which are especially suitable for the separation of cortisol, cortisone, aldosterone, corticosterone, cortexone and progesterone. By means of two dimensional chromatograms the decrease in absorptive power of the Kieselgel layer by suitable impregnation with the stationary phase was investigated. After impregnation of the Kieselgel layer with a 40% solution of formamide in acetone, hexane/benzene and benzene/chloroform systems gave predominantly a partition system. Descending and continuous thin layer chromatographic techniques are described. Author

N74-27591*# Michigan Univ., Ann Arbor. High Altitude Engineering Lab.

HIGH RESOLUTION SPECTROSCOPIC MEASUREMENTS OF CARBON DIOXIDE AND CARBON MONOXIDE Technical Report

Lucian W. Chaney Jul. 1972 83 p refs

(Contract NSR-23-005-376; ORA Proj. 036350)

(NASA-CR-130139; Rept-036350-3-T) Avail: NTIS HC $7.25 CSCL 07D

A modified 1.83 meter Jarrell-Ash spectrometer is reported. The instrument was double passed and achieved a resolution of 0.05 cm at 15 micrometers. An integrating voltmeter was used to optimize the available integration time. Data were obtained in the 15 micrometer and 4.3 micrometer band of CO2 and the 4.6 micrometer and 2.3 micrometer bands of CO. The data are summarized and examples of typical spectra are given. All the data are stored on IBM cards. Author

N74-27592# Bureau of Mines, Laramie, Wyo. Energy Research Center.

RETORTING INDEXES FOR OIL-SHALE PYROLYSES FROM ETHYLENE-ETHANE RATIOS OF PRODUCT GASES

I. A. Jacobson, Jr., A. W. Decora, and G. L. Cook 1974 25 p refs Sponsored in part by Wyo. Univ.

(BM-RI-7921) Avail: NTIS HC $4.25 CSCL 10A

In a closely controlled laboratory retorting system for oil shale, a relationship was developed between the temperature in the retort and the weight ratio of ethylene to ethane in the gases produced. Reciprocal temperature was shown to be directly proportional to the log (ethylene/ethane). From this relationship, a number, called retorting index, was developed. The retorting index has the dimension of temperature, but its magnitude depends on both temperature and residence time for the reactants in the heated zone in the oil shale retort. The slopes of the lines relating reciprocal temperature and the logarithm of the ethylene-ethane ratios are nearly constant for each of the retorting processes for which data were presented. The retorting index should be a valuable tool to control the operation of oil shale retorts, either aboveground or in situ. If an optimum operating condition can be established, the maintenance of the optimum or the departure from it should be easily monitored by use of the index. Author

N74-27593# Defence Standards Labs., Maribyrnong (Australia).

THE MASS SPECTRA OF SCHIFF BASES. 3: RE-EXAMINATION OF ALPHADEUTEROBENZYLIDENE-ANILINE

R. G. Gillis and R. J. Mathews Nov. 1973 9 p refs

(TN-320) Avail: NTIS HC $4.00

The mass spectrum of alpha deutero benzylidene aniline was re-examined at various ionization energies and drawout potentials. There is no scrambling between azomethine and ring hydrogens; the latter form approximately 20% of (M-H)(+). Author

N74-27594# Defence Standards Labs., Maribyrnong (Australia).

LOW INTENSITY, LONG DURATION CHEMILUMINESCENCE FROM BIS (TRICHLOROPHENYL) OXALATE ESTER SYSTEMS

M. E. C. Biffin and D. B. Paul Sep. 1973 22 p refs

(Rept-568) Avail: NTIS HC $4.25

Chemiluminescent reactions capable of producing low intensity illumination for a full night-time duration have possible defence application. The effect of oxalic acid, potassium salicylate, and combinations of these additives on the intensity and lifetime of the chemiluminescence from 2,4,5- and 2,4,6,-bis (trichlorophenyl)oxalate were investigated with the aim of producing a chemiluminescent lighting system to meet this requirement. The most satisfactory light emission was given by .0075 M, 2,4,6-TCPO and 0.0038 M H2O2 in the presence of 0.00005 M oxalic acid: after an induction period of approximately 5 min low intensity chemiluminescence continued for 15 h. Author

N74-27595# Defence Standards Labs., Maribyrnong (Australia).

THE STABILITY OF METHANEPHOSPHONATE TO ELECTRO-OXIDATION

L. F. G. Williams and M. W. Jarvis Nov. 1973 11 p refs

(TN-321) Avail: NTIS HC $4.00

The stability of the carbon-phosphorus bond in the dipotassium salt of methanephosphonic acid was confirmed by its resistance to electrooxidation in aqueous solution at a platinum electrode up to a potential of + 3.0 v(nhe). Potentiostatic and potentiodynamic voltammograms indicated that the phosphonate anion was absorbed at the platinum electrode. Author

N74-27596# Cornell Univ., Ithaca, N.Y. Materials Science Center.

STUDY OF IMPURITY MODES IN ALKALI HALIDES THROUGH LOW-TEMPERATURE SPECIFIC HEAT AND THERMAL-CONDUCTIVITY MEASUREMENTS

P. P. Peressini Aug. 1973 65 p refs

(Contract AT(11-1)-3151)

(COO-3151-3) Avail: NTIS HC $5.25

Specific heat and thermal conductivity measurements at 0.05 to 1 K were used to study the low lying energy levels or tunneling states of Li and OH in KCl and CN in KCl, KBr, KI, and RbCl. Author (NSA)

N74-27597# R and D Associates, Santa Monica, Calif.

ARPA WORKSHOP ON NEEDS OF THE DEPARTMENT OF DEFENSE FOR CATALYSIS. VOLUME 1: SUMMARY OF RESULTS OF PARTICULAR INTEREST TO THE DOD Technical Report, Mar. - Dec. 1973

Leona Marshall Libby Dec. 1973 19 p refs

(Contract DAHC15-73-C-0312)

(AD-777753; RDA-TR-3501-001-Vol-1) Avail: NTIS CSCL 07/4

The general conclusions reached by the ARPA Workshop on Needs of the Department of Defense for Catalysis are that national direction and guidance of catalytic research is essential in order that the DOD attain self-sufficiency in military fuel and petrochemical needs, and that ARPA should play a leading role in this effort. Author (GRA)

N74-27598# Texas Univ., Austin. Dept. of Physics.

THEORETICAL STUDY OF THE EFFECTIVE POLARIZABILITY OF ADSORBED MOLECULES ON METAL SURFACES Final Report

Peter R. Antoniewicz 10 Apr. 1974 16 p refs

(Contract N00014-67-A-0126-0018)

(AD-777454) Avail: NTIS CSCL 07/4

The report concerns the effect of the presence of the surface on the polarizability of adsorbed molecules on metal surfaces. It is pointed out that one must invoke the idea of the polarizability of the substrate in order to agree with the experiment. An interaction, leading to an induced dipole moment of adsorbed molecules which consequently reduces the work function, is described. Author (GRA)

N74-27599# Army Cold Regions Research and Engineering Lab., Hanover, N.H.

ADHESION OF ICE FROZEN FROM DILUTE ELECTROLYTE SOLUTIONS

H. H. G. Jellinek Mar. 1974 12 p refs

(DA Proj. 1T0-61102-B-52-A02)

(AD-776370; CRREL-RR-317) Avail: NTIS CSCL 07/4

Experiments by Smith-Johannsen on the adhesion of ice frozen from a number of 0.001 M electrolyte solutions to a wax-treated aluminum surface at -10C are discussed. It is concluded that the adhesive strength measured by the force per square centimeter needed to shear the ice off the substrate surface is mainly due to a liquid interfacial solution layer between the ice and the substrate surface. The thickness of such a layer is largely determined by the same considerations as the

thickness of grain boundary layers in ice obtained from dilute electrolyte solutions. Author (GRA)

N74-27600# Air Force Academy, Colo. Frank J. Seiler Research Lab.
EXPERIMENTAL MEASUREMENT OF OSCILLATOR STRENGTHS IN NEUTRAL XENON USING THE ROSCHDESTVENSKII HOOK METHOD Interim Report, Dec. 1971 - Jan. 1974
Carl A. Forbrich, Jr. Mar. 1974 11 p refs
(AF Proj. 7905)
(AD-777599; SRL-TR-74-0005) Avail: NTIS CSCL 07/4

Experimental measurements were performed of selected transitions between the two lowest excited levels in xenon gas, the 6s-6p: blue transitions. Interference fringe patterns produced by a Mach-Zehnder interferometer, with the electrically excited xenon in one beam, are analyzed spectrally in an attempt to obtain relative f-values. (Modified author abstract) GRA

N74-27601# Aerospace Corp., El Segundo, Calif. Astrophysics Lab.
VIBRATIONAL ENERGY OF EXCHANGE OF THE DF(v = 2) STATE WITH DF(v = 0)
J. F. Bott 5 Mar. 1974 21 p refs
(Contract F04701-73-C-0074)
(AD-776817; TR-0074(4530)-7; SAMSO-TR-74-50) Avail: NTIS CSCL 07/4

The energy transfer rate for the reversible reaction DF (v = 1) + DF (v = 1) and DF (v = 0) + DF (v = 2) + delta E = 91.6/cm was studied in a combined shock tube laser-induced fluorescence experiment at temperatures from 295 to 720 K. The rate coefficient K sub vv for the exothermic reaction was found to vary as 1/T when expressed in units of cc/mole times sec. At T = 295 K, the probability of the reaction is approximately 0.2 per collision. Author

N74-27602# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
RESONANCE SCATTERING OF LYMAN-ALPHA RADIATION BY HYDROGEN IN THE GROUND STATE Physical Sciences Research Papers
Harry E. Moses 6 Dec. 1973 35 p refs
(AF Proj. 7635)
(AD-777213; AFCRL-TR-73-0744; AFCRL-PSRP-578) Avail: NTIS CSCL 07/4

The authors calculate the cross section for the resonance scattering of Lyman-alpha radiation by spinless, non-relativistic hydrogen atoms in the ground state using a two-level model. A slight generalization of Dirac's resonance scattering theory is used (to take into account the degeneracy of the upper state) together with the exact matrix elements for the electromagnetic interaction. The shift in position of resonance is finite. The differential cross section is given as a function of the scattering angle for both polarized and unpolarized radiation. The total cross section is shown to be equal to that obtained by detailed balancing using the Einstein A and B coefficients. Finally, the radiation pattern of the scattered radiation is found. (Modified author abstract) GRA

N74-27603# Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy and Materials Science.
NEW THEORETICAL MODEL FOR THE ELECTRONIC STRUCTURES OF POLYATOMIC MOLECULES AND COMPLEX MATERIALS Final Technical Report, 1 Feb. 1969 - 31 Dec. 1973
Keith H. Johnson 15 Feb. 1974 46 p refs
(Contract F44620-69-C-0054; AF Proj. 9767)
(AD-777189; AFOSR-74-0464TR) Avail: NTIS CSCL 07/4

The development of the SCF-X alpha scattered-wave method of calculating the electronic structures of polyatomic molecules and complex solids is described. Details of the theory and computational procedure are presented along with a comprehensive summary of applications. Author (GRA)

N74-27604# Stanford Research Inst., Menlo Park, Calif.
PHOTODISSOCIATION OF CO3(-) Interim Report, 1 Apr. - 31 Dec. 1973
J. T. Moseley, R. A. Bennett, and J. R. Peterson Mar. 1974 13 p
(Contract DAHC04-73-C-0016)
(AD-777512; BRL-CR-144) Avail: NTIS CSCL 07/5

The photodissociation reaction CO3(-) + hv to CO2 + O(-) has been observed at seven photon energies between 2.35 and 2.71 eV using a drift tube mass spectrometer and an argon ion laser. The total cross sections for the destruction of CO3(-) due to photons of these energies have been measured, and it is concluded that essentially all of this destruction is due to photodissociation. The photodestruction of CO3(-)/H2O has also been observed at four photon energies. Author (GRA)

N74-27605# Army Electronics Command, Fort Monmouth, N.J.
FREEZING WATER WITH SIZED AgI PARTICLES. 3: EXPERIMENTAL PROCEDURE, RESULTS, AND CONCLUSIONS
Hermann E. Gerber Mar. 1974 72 p refs
(DA Proj. 1T0-61102-B-53A)
(AD-777502; ECOM-5520) Avail: NTIS CSCL 07/4

The experimental objective of this study is to determine the relationship between the sizes of thermal AgI particles and the particles: ability to activate ice by freezing. That relationship is essential to determine the efficiency of the generator output, which in turn is required for a reasonable guess of the outcome of cloud seeding experiments. The following sections of this paper describe in detail the experimental design of the particle size-activity measurements. Included are the techniques to generate uncoagulated thermal AgI particles, to collect the particles as a function of their size on the collecting foil of the Goetz Aerosol Spectrometer, to activate the particles on the foil in the cold chamber which properly simulates the freezing mechanism of ice nucleation, and to record the nucleation events as a function of activation time and temperature. The experimental results are compared to the theoretical predictions. GRA

N74-27606# Naval Intelligence Support Center, Washington, D.C. Translation Div.
[PHOTOCOLORIMETRIC AND GAS CHROMATOGRAPHIC ANALYSIS TECHNIQUES]
29 Nov. 1973 9 p Transl. into ENGLISH from Gigiena i Sanit. (Moscow), no. 11, 1972 p 71-73 and no. 12, 1972 p 77-78
(AD-777432; NISC-Trans-3475) Avail: NTIS CSCL 07/4

Contents: A photocolorimetric method of determining microconcentrations of carbon monoxide; A gas chromatographic method of determining carbon dioxide in the air. GRA

N74-27607# Army Missile Command, Redstone Arsenal, Ala. Physical Sciences Directorate.
A FEASIBILITY SURVEY OF SOME ANALYTIC TECHNIQUES FOR MEASURING FLUORINE ATOM CONCENTRATION IN LASERS
1 Mar. 1974 27 p refs
(DA Proj. 1T6-62609-A-308)
(AD-777537; RD-74-1) Avail: NTIS CSCL 07/4

The results of a literature survey of several analytical techniques and their applicability toward measuring fluorine atom concentrations in laser systems are reported. These techniques include: electron paramagnetic resonance, absorption spectroscopy, mass spectrometry-molecular beam, electron beam fluorescence, Raman scattering, and photoelectron spectroscopy. Author (GRA)

N74-27608# Utah Univ., Salt Lake City. Dept. of Chemistry.
LASER INDUCED CHEMICAL REACTION
J. Thomas Knudtson and Edward M. Eyring 28 Feb. 1974 41 p refs
(Contract N000014-67-0325-0008; NR Proj. 051-556)
(AD-777460; TR-2) Avail: NTIS CSCL 07/5

The report contains a literature review of several laser topics: infrared laser induced chemical reactions, UV-visible laser induced chemical reactions, multi-photon reactions, selective two step laser induced chemical reactions, and laser temperature jump relaxation method experiments. (Modified author abstract) GRA

N74-27609# Aerospace Corp., El Segundo, Calif. Aerophysics Lab.
TEMPERATURE DEPENDENCE OF VIBRATIONAL ENERGY TRANSFER FROM DF (v EQUALS 1) TO SEVERAL DIATOM-

ICS
Jerry F. Bott 11 Mar. 1974 38 p refs
(Contract F04701-73-C-0074)
(AD-776816; TR-0074(4530)-8; SAMSO-TR-74-55) Avail: NTIS CSCL 07/4

The V - V energy transfer rates from DF (v = I) to HCl, HBr, DBr, D2, N2, O2, CO, and NO have been measured at temperatures from 295 to approximately 800 K. The measurements were made behind reflected shock waves with the laser-induced fluorescence technique. The rates for V - V transfer to the infrared active molecules show an inverse temperature dependence near room temperature characteristic of collisions dominated by attractive potentials. The rates for V - V transfer to the homonuclear diatomics have positive temperature dependence, typical of short range repulsive potential interactions. Several rates of V-R, T deactivation by DF were also obtained.
Author

N74-27610# R and D Associates, Santa Monica, Calif.
ARPA WORKSHOP ON NEEDS OF THE DEPARTMENT OF DEFENSE FOR CATALYSIS, VOLUME 2
Leona M. Libby, Joe W. Hightower (Rice Univ.), and Willard F. Libby (Calif. Univ., Los Angeles) Nov. 1973 441 p refs Prog. Held at Santa Monica, Calif., 5-6 Nov. 1973
(Contract DAHC15-73-C-0312)
(AD-777734; RDA-TR-3501-002-Vol-2) Avail: NTIS CSCL 07/1

Volume II contains the proceedings of the workshop on Needs of the Department of Defense for Catalysis, consisting of talks given by 26 research scientists in industry and the universities, and discussions following the talks. Topics include fuel refinement, processing, and conversion, exhaust gas control, catalysis theory and kinetics, and fuel cells.
GRA

N74-27611# Scientific Research Instruments Corp., Baltimore, Md.
GASIFICATION OF FOSSIL FUELS UNDER OXIDATIVE, REDUCTIVE, AND PYROLYTIC CONDITIONS Final Report
A. L. Yergey, F. W. Lampe, M. L. Vestal, E. J. Gilbert, and G. J. Ferguson Dec. 1973 184 p refs
(Contract EPA-68-02-0206)
(PB-228668/0; SRIC-72EPA-650/2-73-042) Avail: NTIS HC $12.25 CSCL 07A

Kinetic reaction data are described, produced in a nonisothermal kinetics laboratory while gasifying selected types of coal under oxidative, reductive, and pyrolytic conditions. Types of coal cover the range, including lignite and anthracite. Evolution of thermal decomposition products under study conditions were investigated at different fuel heating rates and gasification pressures. Gaseous product evolution rates, as the function of temperature, were graphed for different coals, exposed to indicated gasification regimes. The evolution of such gaseous species as H2O, CO, CO2, O2, SO2, NO, H2, CH4, H2S, and C2H2 was followed up in conjunction with 13 different coal gasification reactions.
GRA

07 COMMUNICATIONS

Includes communications equipment and techniques; noise; radio and communications blackout; modulation telemetry; tracking radar and optical observation; and wave propagation. For basic research see: 23 Physics, General; and 21 Navigation.

N74-27612* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
TECHNIQUE FOR RECOVERY OF VOICE DATA FROM HEAT DAMAGED MAGNETIC TAPE Patent
Joe F. Melugin and David E. OBrien, III, inventors (to NASA) Issued 25 Jun. 1974 5 p Filed 16 Jan. 1973 Supersedes N73-16132 (11 - 07, p 0755)
(NASA-Case-MSC-14219-1; US-Patent-3,819,440; US-Patent-Appl-SN-324029; US-Patent-Class-156-94; US-Patent-Class-117-2R; US-Patent-Class-179-100.2A, US-Patent-Class-179-100.2B; US-Patent-Class-264-36) Avail: US Patent Office CSCL 14C

A method for conditioning, and thus enabling retrieval of intelligence from, magnetic tapes after damage from heat has caused the tape to wrinkle and curl severely thereby reducing tape width to less than one-half its original size. The damaged tape is superposed on a first piece of splicing tape with the oxide side of the magnetic tape in contact with the adhesive side of the splicing tape and then carefully smoothed by a special tool. A second piece of splicing tape is placed on the backing side of the magnetic tape then the resulting tape stack is trimmed to the original width of the magnetic tape. After the first piece of splicing tape is carefully removed from the oxide side of the damaged magnetic tape, the resulting magnetic tape is then ready to be placed into a recorder for playback.
Official Gazette of the U.S. Patent Office

N74-27613 California Univ., Los Angeles.
THEORETICAL PREDICTION OF ELECTROMAGNETIC NEAR-FIELD DISTRIBUTION OF TWO-DIMENSIONAL OBJECTS FROM KNOWN FAR-FIELD DATA Ph.D. Thesis
Shinobu James Hamada 1973 191 p
Avail: Univ. Microfilms Order No. 74-11530

Analytical means for predicting the near-zone electromagnetic field distribution of two-dimensional objects from know farzone field data are developed. The classical infinite slit in a screen or ribbon is treated in this problem. The homogeneous two-dimensional vector wave equation in free space is solved to obtain the fields in cylindrical coordinates. For boundary conditions prescribed over a given cylindrical surface, the field solution is constructed by superposition of cylindrical wave functions. Fourier analysis is used to determine the modal coefficients by matching the known far-fields on a cylindrical surface. Once the modal coefficients are determined, the electromagnetic field can then be determined at any arbitrary distance from the source when this distance is greater than the radius of the smallest cylinder enclosing the source.
Dissert. Abstr.

N74-27614 Arizona Univ., Tucson.
NUMERICAL METHODS IN ELECTOMAGNETIC FIELD PROBLEMS Ph.D. Thesis
Peter Constantine Bargeliotes 1974 168 p
Avail: Univ. Microfilms Order No. 74-9880

A technique is developed which is used to determine the currents on perfectly conducting bodies by minimizing the error in the boundary conditions. The technique is particularly useful in solving planar antenna problems. This is accomplished by approximating the four-vector current density by a set of basis functions over the domain of the perfectly conducting surfaces, resulting in an approximated four-vector potential field everywhere in space. The approximation is made best by minimizing a mean square error functional between the resulting approximated field and a correct field from a specified testing source. The two-dimensional Gaussian density function is used as the basis function for the four-vector current density components. The use of the Gaussian density function is particularly desirable because it simplifies the evaluation of the inner products which define the coefficient matrix of the problem.
Dissert. Abstr.

N74-27615 Communications Research Centre, Ottawa (Ontario). Dept. of Communications.
CALCULATED RADIATION PATTERNS
J. L. Thomas and E. D. DuCharme Apr. 1974 150 p
(CRC-1255) Copyright. Avail: Issuing Activity

The radiation patterns of several common HF antennas were calculated for different types of ground for frequencies between 2 and 30 MHz. These patterns are for the use of communications engineers in the design of HF communications systems.
Author

N74-27616*# Kanner (Leo) Associates, Redwood City, Calif.
OPTIMUM SIGNAL RECEPTION AND THE POTENTIAL ACCURACY OF SPACE MEASURING COMPLEXES
P. Olyanyuk Washington NASA May 1974 179 p refs Transl. into ENGLISH of the book "Optimalnyy priyem i potentsialnaya Tochnost Kosmicheskikh Izmeritelnykh Kompleksov" Moscow, Sovetskoye Radio Press, 1973 184 p
(Contract NASw-2481)
(NASA-TT-F-15628) Avail: NTIS HC $12.00 CSCL 17B

The optimum reception of signals from space vehicles and artificial earth satellites are discussed in terms of potential accuracy

of measurements. The parameters of motion are explained, and various illustrative mathematical formulas are used to compare a priori and actual data. Topics covered include: autocorrelation functions, error correlation matrices, optimum signal filtration, orbital parameters, planetary radar systems, signal delay, signal processing, and various statistical methods of analysis. Author

N74-27617# Joint Publications Research Service, Arlington, Va.
TRANSMISSION OF INFORMATION UNDERWATER
Yu. F. Tarasyuk 4 Jun. 1974 51 p refs Transl. into ENGLISH from the book "Peredacha Informatsii Pop Vodoy" Moscow, 1974 p 1-64
(JPRS-62161) Avail: NTIS HC $5.75

Features of underwater data transmission using hydroacoustic signals are reported and the results of remote measurements and telecontrol commands. Author

N74-27618*# Techtran Corp., Glen Burnie, Md.
OUTLINE OF RADIATIVE TRANSFER THEORIES APPLICABLE TO PROPAGATION IN THE SEA
L. Prieur and A. Morel Washington NASA Jul. 1974 49 p refs Transl. into ENGLISH from "Optics of the Sea (Interface and In-Water Transmission and Imaging)", AGARD, Nevilly sur Seine, France, report AGARD-LS-61, Aug. 1973 25p
(Contract NASw-2485)
(NASA-TT-F-15659) Avail: NTIS HC $5.50 CSCL 20N

A survey is made of current theories of radiation transfer which may be applied to the propagation of electromagnetic waves in seawater. The physical factors providing optical characterization of seawater are reviewed, and the various methods of caluculating them are discussed in brief. An evaluation is made of the methods currently employed and the advantages and disadvantages of each method are presented. Author

N74-27619*# Ohio State Univ., Columbus. ElectroScience Lab.
FLUSH-MOUNTED DIELECTRIC-LOADED AXIAL SLOT ON CIRCULAR CYLINDER
J. H. Richmond Jun. 1974 34 p refs
(Grant NGL-36-008-138)
(NASA-CR-138752; ESL-2902-17) Avail: NTIS HC$4.75 CSCL 20N

The theory, computer program, and numerical results of an investigation of an axial slot antenna on a circular cylinder are discussed. The cylinder is partially coated with a dielectric layer and the antenna radiates through a flush mounted window. The study was conducted to determine the effects of a high temperature dielectric layer on the performance of antennas mounted on a space shuttle. Mathematical models are developed to show the relationships of the parameters. Curves are developed to compare the theoretical and actual far field radiation patterns. Author

N74-27620*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE DEEP SPACE NETWORK Progress Report, Mar. - Apr. 1974
15 Jun. 1974 146 p refs
(Contract NAS7-100)
(NASA-CR-138803; JPL-PR-42-21) Avail: NTIS HC $10.50 CSCL 17I

The objectives, functions, and organization of the deep space network are summarized. Progress in flight project support, tracking and data acquisition research and technology, network engineering, hardware and software implementation, and operations is reported. Interface support for the Mariner Venus Mercury 1973 flight and Pioneer 10 and 11 missions is included. G.G.

N74-27621*# Power Electronics Associates, Inc., Fairview Park, Ohio.
ENGINEERING INFORMATION ON AN ANALOG SIGNAL TO DISCRETE TIME INTERVAL CONVERTER (ASDT-IC)
Francisc C. Schwarz Jun. 1974 188 p refs
(Contract NAS3-16791)
(NASA-CR-134544) Avail: NTIS HC $12.50 CSCL 17B

An electronic control system for nondissipative dc power converters is presented which improves (1) the routinely attainable static output voltage accuracy to the order of + or - 1% for ambient temperatures from -55 to 100 C and (2) the dynamic stability by utilizing approximately one tenth of the feedback gain needed otherwise. Performance is due to a functional philosophy of deterministic pulse modulation based on pulse area control and to an autocompensated signal processing principle. The system can be implemented with commercially available unselected components. Author

N74-27622*# Radio Corp. of America, Princeton, N.J. Astro Electronics Div.
LOW COST VHRR/AVHRR GROUND STATION STUDY PROGRAM Final Report
10 Apr. 1974 205 p
(Contract NAS5-21969)
(NASA-CR-139030) Avail: NTIS $13.25 CSCL 17B

Selected ground station elements for various equipment configurations are considered which could be used to receive and record signals from very high resolution radiometers on the ITOS-D series of meteorological spacecraft. Evaluation criteria are: (1) Modular station design ranging from low cost relatively inflexible system to more costly sophisticated modules; (2) maximum use of available equipment; and (3) low cost. Illustrative examples of several station configurations are provided together with indicated probable ranges of cost for each. The lowest cost station configuration features a 6-foot self tracking dish antenna; an uncooled parametric preamplifier, down-converter, and line driver; a receiver and carrier demodulator; a single subcarrier discriminator; and a single channel reproducer with a built-in film processor. G.G.

N74-27623*# National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.
RADIO FREQUENCY STUDIES IN THE NASA LEWIS BUMAY TORUS
Glenn A. Gerdin 1974 18 p refs Presented at the 1st Intern. Conf. on Plasma Sci., Knoxville, Tenn., 15-17 May 1974; sponsored by IEEE
(NASA-TM-X-71567; E-8003) Avail: NTIS HC $3.00 CSCL 17B

The fluctuations in potential of the plasma in the NASA Lewis Bumpy Torus were observed using capacitive probes over frequencies from 1 kHz to 25 MHz and a wide range of operating conditions. The spectra were found to differ greatly above and below a background gas pressure of 3.0.000034 torr deuterium. Above this pressure the spectrum was dominated by the ion spoke frequency and a spectral index was defined. Below this pressure the spectrum below 200 kHz was lower in lower in amplitude by a factor of ten and no spectral index could be defined. At these lower pressures, fluctuations that appeared to be ion spokes were observed, but had a dependence of frequency on operating conditions which was previously unreported. Author

N74-27624*# Linkabit Corp., San Diego, Calif.
CODED SPREAD SPECTRUM DIGITAL TRANSMISSION SYSTEM DESIGN STUDY Final Report
J. A. Heller, J. P. Odenwalder, and A. J. Viterbi May 1974 126 p refs
(Contract NAS9-13733)
(NASA-CR-134310) Avail: NTIS HC $9.50 CSCL 17B

Results are presented of a comprehensive study of the performance of Viterbi-decoded convolutional codes in the presence of nonideal carrier tracking and bit synchronization. A constraint length 7, rate 1/3 convolutional code and parameters suitable for the space shuttle coded communications links are used. Mathematical models are developed and theoretical and simulation results are obtained to determine the tracking and acquisition performance of the system. Pseudorandom sequence spread spectrum techniques are also considered to minimize potential degradation caused by multipath. Author

N74-27625# Australian Post Office Research Labs., Melbourne.
AN HISTORICAL SURVEY OF COMMUNICATIONS SATELLITE SYSTEMS
M. Balderston Feb. 1974 39 p refs
(Rept-6867) Avail: NTIS HC $5.00

The history of communications satellites from 1945 to the

present is given. Experimental and operational satellites and satellite systems, past, present, and future, are described. Some applications are discussed, and two related subjects, operating frequencies and launch vehicles, are mentioned. Author

N74-27626# Australian Post Office Research Labs., Melbourne.
DISTORTION DUE TO MULTIPATH TRANSMISSION IN AN FM BROADCASTING SYSTEM
J. V. Murphy Mar. 1974 9 p refs
(Rept-6874) Avail: NTIS HC $4.00

A factor affecting the viability of high quality FM broadcasting systems is the distortion which will occur due to multipath propagation. The expected distortion is calculated based on two sets of approximate data on the incidence of reflections in VHF/UHF propagation. The calculations show that distortion should not be noticeable under typical conditions. Author

N74-27627# Ceskoslovenska Akademie Ved, Ondrejov. Observatory Ondrejov.
SOLAR RADIO NOISE MEASUREMENTS OF APRIL 1974
Apr. 1974 16 p
Avail: NTIS HC $4.00

Solar radio emission measurements for April, 1974, are shown by hours of observation, daily data, outstanding occurrences, and a diagram of daily flux densities. G.G.

N74-27628# Ceskoslovenska Akademie Ved, Ondrejov. Observatory Ondrejov.
SOLAR RADIO NOISE MEASUREMENTS OF MARCH 1974
Mar. 1974 14 p
Avail: NTIS HC $4.00

Daily observation of solar flux in various frequencies and on the solar radio spectrograph are reported. Observed values of solar radio emission and outstanding occurences are also presented. A.A.D.

N74-27629# Calspan Corp., Buffalo, N.Y.
ABSORPTION OF ELECTROMAGNETIC WAVES NEAR THE CRITICAL DENSITY Annual Report, 1 Dec. 1972 - 30 Nov. 1973
J. W. Daiber, R. G. Rehm, and H. M. Thompson 1973 30 p refs
(Contract AT(11-1)-2288)
(COO-2288-4) Avail: NTIS HC $3.50

The program is an experimental study of the interaction of high-intensity ruby laser radiation with hydrogen gas in a free-jet. In these experiments, both laser intensity and the plasma frequency can be varied. By monitoring several parameters, including incident and reflected power, X-ray emission and the kinematics of plasma growth, the existence of an anomalous threshold for coupling radiation into plasma energy should be determinable. A discussion of the status of the Calspan experiment and of the status of other anomalous coupling studies at laser frequencies is presented. Author (NSA)

N74-27630# Transportation Systems Center, Cambridge, Mass.
COMPARISON OF MULTIPLE BEAM COVERAGE TO EARTH COVERAGE FOR A MARITIME SATELLITE SYSTEM Interim Report, Jan. - Jun. 1972
C. J. Murphy Dec. 1973 44 p refs
(PB-226664/1; DOT-TSC-OST-73-25) Avail: NTIS HC $3.00
CSCL 17B

Preliminary tradeoff comparisons were analyzed for a possible baseline L-band maritime communications satellite system. Primary emphasis was given to major shipping routes with secondary coverage eleswhere. A low cost satellite configuration was postulated based on a Thor-Delta class satellite. Computer analyses were conducted to assess tradeoffs between satellite antenna complexity, in terms of multiple beam vs. earth coverage, and user access delay time and shipboard antenna complexity in terms of gain. GRA

N74-27631# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
AN AIRBORNE RADAR TECHNIQUE FOR MOVING-TARGET DETECTION, LOCATION, AND TRACKING Physical Sciences Research Papers
John K. Schindler and William B. Goggins 26 Nov. 1973 55 p refs
(AF Proj. 5635)
(AD-777214; AFCRL-TR-73-0719; AFCRL-PSRP-576) Avail: NTIS CSCL 17/9

A novel technique for detecting, locating, and tracking moving targets from an airborne radar platform is described and analyzed. The technique uses the generally dissimilar linear Doppler frequency modulated signals from moving targets and stationary ground clutter. A matched filter processor is defined and its resolution and ambiguity properties studied as function processor parameters. Sub-clutter visibility of the processor is then determined. Two techniques for digitally implementing the processor are discussed and the computational efficiencies briefly analyzed. Finally, target angular position can be determined using phase monopulse. It is then shown that target velocity--both ground speed and target heading--can be determined from radar observables. Author (GRA)

N74-27632# Technology Service Corp., Santa Monica, Calif.
DETECTION OF WEAK SIGNALS WITH UNKNOWN COHERENCE TIME
Gene B. Goldstein 27 Mar. 1974 58 p refs
(Contract N00014-71-C-0033)
(AD-777129; TSC-PD-067-23) Avail: NTIS CSCL 09/4

The problem of detecting a signal whose coherence time is short compared to the total time of observation is examined. Further, the signal's coherence time is regarded as unknown. The signal itself is assumed to have a constant amplitude, and its phase and frequency may change in an arbitrary fashion from one coherence interval to the next. Though no assumption is made regarding the signal-to-noise ratio per coherence interval, it is assumed that the integrated signal-to-noise ratio over the the total processing time is large enough for useful detection probabilities to result. This is to be distinguished from an assumption of large signal-to-noise per coherence interval, in which case there is little motivation to process the entire data record before detection. The structure of the maximum-likelihood detector for this signal in white, zero mean, Gaussian noise is derived and the detection performance is numerically evaluated for specific cases. Author (GRA)

N74-27633# Technology Service Corp., Santa Monica, Calif.
MISMATCH LOSS FOR A CW PHASE VARIABLE SIGNAL
G. W. Lank 11 Apr. 1974 46 p refs
(Contract N00014-71-C-0033)
(AD-777463; TSC-PD-067-22) Avail: NTIS CSCL 09/4

Assume a narrowband cw signal has a phase which is not coherent over the total time of observation. Also the coherence time is unknown but fixed. The amplitude and center frequency of the signal are also unknown but fixed over the time of observation. A detection algorithm is considered in which the sum of the filter outputs from a fixed bank of filters is compared to a threshold for detection purposes. The filters in the bank each have the same bandwidth and are separated by this bandwidth. In the document the detection performance is obtained for this detector. The results are compared to the detection performance which would be obtained by an optimum detector where the amplitude, center-frequency and coherence time are assumed known. Author (GRA)

N74-27634# Speech Communications Research Lab., Inc., Santa Barbara, Calif.
RESEARCH ON SPEECH COMMUNICATION AND AUTOMATIC SPEECH RECOGNITION Final Report
David J. Broad 15 Feb. 1974 24 p
(Contract F44620-69-C-0078; AF Proj. 9769)
(AD-777191; AFOSR-74-0582TR) Avail: NTIS CSCL 05/7

The report summarizes two major areas of research. The first area is concerned with the theory of phonology, which has included work on the units of phonology, a theory of symbolization, the completion of a large computer-based quasi-phonemic/orthographic dictionary of American English, some work on dialect description, and the formalization of a functional phonemic theory. The second area is concerned with logical procedures for the interpretation of acoustic phonetic data. The study includes a massive investigation of formant frequency transitions in CVC syllables as well as an anlysis of the segment durations in the

same syllables. This work was extended to a study of the use of formant frequency information in automatic speech recognition. Segmentation using formant dynamics and the sources of formant frequency variability were investigated. The relations between the applied problems at different levels of automatic speech recognition and various basic problems in speech and language were outlined in detail. (Modified author abstract) GRA

N74-27635# Signatron, Inc., Lexington, Mass.
RECEIVER CANONIC MODELS Interim Report, 8 Jun. - 8 Sep. 1973
J. N. Pierce Feb. 1974 65 p
(Contract F30602-73-C-0206)
(AD-777195; RADC-TR-74-6; IR-2) Avail: NTIS CSCL 17/2

The zonal form of the nonlinear response to modulated inputs is determined. It is shown by combinatorial arguments that modelling should be restricted to third-order Volterra systems for manageable complexity. The theoretical basis of canonic modelling and weaknesses of earlier models are explored. Criteria for useful models are established which define four specific models for further studies. It is then determined that direct measurement of the transfer function at selected points is the most favorable measurement technique from which model parameters can be determined. Author (GRA)

N74-27636# RAND Corp., Santa Monica, Calif.
THE ROLE OF ACOUSTIC PROCESSING IN SPEECH UNDERSTANDING SYSTEMS
A. S. Hoffman Oct. 1973 37 p refs
(Contract DAHC15-73-C-0181; ARPA Order 189)
(AD-777076; R-1356-ARPA) Avail: NTIS CSCL 17/2

The author discusses methods and problems of acoustic signal processing for systems to enable machines to understand spoken communication. Emphasis is on research outside of the ARPA-sponsored SUR (Speech Understanding Research) study. This acoustic level processing includes three steps, not necessarily distinct: (1) preprocessing the original analog signal or its digitized form by basic techniques such as amplitude compression; (2) analysis of the preprocessed signals using fast Fourier transformations, digital filtering, etc; and (3) parameterizing the results in phoneme-sized chunks by formats, autocorrelation techniques, etc. Problems include (1) environmental noise, (2) transducer limitations, (3) determining an appropriate parameterization technique, and (4) coping with wide phonetic, syntactic, and semantic variability of speech. (Modified author abstract) GRA

N74-27637# Physical Dynamics, Inc., Berkeley, Calif.
SCATTERING OF ELECTROMAGNETIC WAVES FROM THE TWO DIMENSIONAL OCEAN SURFACE. 1: LINEAR WAVES IN THE PRESENCE OF CURRENT
Kenneth M. Watson and Bruce J. West Jan. 1974 29 p refs
(Contract F30602-72-C-0494; ARPA Order 1649; AF Proj. 1649)
(AD-777627; PD-73-050; RADC-TR-74-42) Avail: NTIS CSCL 20/14

The scattering of electromagnetic waves from the ocean surface when a current is present is studied. The electromagnetic waves are singly scattered by two-dimensional linear surface gravity waves interacting with a surface current. The surface is described in terms of a Wigner function, i.e., the spectral density, which has finite spatial gradients. The effect of two dimensions on the spectral perturbation is explored in a preliminary calculation for a Phillip's ambient spectrum. Author (GRA)

N74-27638# Delaware Univ., Newark. Dept. of Mathematics.
RIGOROUS DIFFRACTION THEORY Final Report, Jun. 1969 - Dec. 1973
John S. Asvestas and Ralph E. Kleinman Feb. 1974 15 p refs
(Grant AF-AFOSR-1794-69; AF Proj. 9749)
(AD-777282; AFOSR-74-0455TR; Rept-1794-10) Avail: NTIS CSCL 20/14

A fundamental problem in radar is the determination of how an obstacle perturbs a propagating electromagnetic wave. Both in detection and discrimination of targets of various configuration and constitutive material as well as determining how a vehicle perturbs a signal transmitted from its own antenna, the essential problem is one of predicting the effect on an incident field of an object of any material and shape in any environment. Mathematically, this involves solutions of the wave equation, the Helmholtz equation, and Maxwell's equations with boundary or transition conditions imposed on arbitrarily shaped surfaces. The report describes the results of research on a number of problems in this general area. (Modified author abstract) GRA

N74-27639# Ohio State Univ., Columbus. ElectroScience Lab.
NUMERICAL SOLUTIONS TO SOME ON-AIRCRAFT ANTENNA PATTERN PROBLEMS
R. J. Marhefka and W. D. Burnside Oct. 1973 50 p ref
(Contract N62269-72-C-0354)
(AD-777977; ESL-3390-4) Avail: NTIS CSCL 09/5

The report presents several case studies of numerical solutions to on-aircraft antenna pattern problems. Magnitude and phase pattern comparisons are made for two DF antenna configurations mounted on an F-4 aircraft. A satellite antenna is examined for possible application on P-3, E-2, and S-3 aircraft. Some measured results are presented for comparison with computations and the agreement is quite good. Author (GRA)

N74-27640# Ohio State Univ., Columbus. ElectroScience Lab.
A TECHNIQUE TO COMBINE THE GEOMETRICAL THEORY OF DIFFRACTION AND THE MOMENT METHOD
W. D. Burnside, C. L. Yu, and R. J. Marhefka Aug. 1973 42 p refs
(Contract N62269-72-C-0354)
(AD-777976; ESL-3390-3) Avail: NTIS CSCL 09/5

A technique is developed which can be used to combine the moment method and the Geometrical Theory of Diffraction. Using this approach one should be able to handle a wide variety of new structures which could not have been solved by either technique alone. Many of these new structures occur in the analysis of aircraft antenna patterns and impedance. The approach is developed and verified in terms of simple structures in order to illustrate the approach. Author (GRA)

N74-27641# Ohio State Univ., Columbus. ElectroScience Lab.
ANALYSIS OF ON-AIRCRAFT ANTENNA PATTERNS Final Report
W. D. Burnside May 1973 64 p refs
(Contract N62269-72-C-0354)
(AD-777975; ESL-3390-2) Avail: NTIS CSCL 09/5

High frequency radiation patterns of on-aircraft antennas are analyzed using ray optics techniques. This is a basic study of aircraft-antenna pattern performance in which the analytic aircraft is modelled in its most basic form. The fuselage is assumed to be a perfectly conducting convex surface. The wings are simulated by arbitrarily many sided flat plates and the jet engines are treated as finite circular cylinders. The three principal plane patterns are analyzed in great detail with measured results taken to verify each solution. A volumetric pattern study is initiated with the fuselage modelled by an arbitrary convex surface of revolution. Author (GRA)

N74-27642# Test Group (6585th), Holloman AFB, N.Mex.
ANTENNA GAIN PATTERN MEASUREMENTS ON A BQM-34F TARGET DRONE, VOLUME 5 Final Report
Oct. 1973 276 p refs
(AD-778075; AFSWC-TR-72-20-Vol-5) Avail: NTIS CSCL 17/9

Antenna gain pattern measurements were performed at the U.S. Air Force Radar Target Scatter Facility (RAT SCAT), 6585th Test Group, Holloman Air Force Base, New Mexico, to provide data for the evaluation of scoring and radar cross section augmentation antennas for the BQM-34F supersonic target drone. Wing tip pod located scoring system antennas were measured at ten vehicle roll angles using circular polarization and a frequency of 1775 MHz. Gain pattern data for the antenna system of a prototype BQM-34F active radar cross section augmentation pod were acquired at a frequency of 9130 MHz using both horizontal and vertical polarizations. (Modified author abstract) GRA

N74-27643# Computer Sciences Corp., Falls Church, Va.
COMMUNICATIONS SYSTEM PLANNING, ENGINEERING AND CONTROL (COMSPEC) DRAFT Communications System Management Study, Sep. 1971 - Jun. 1973
Arthur W. Reese and Arnold M. Rathlev 15 Mar. 1973 233 p refs
(Contract DAAG11-70-C-087523)
(AD-778180) Avail: NTIS CSCL 17/2

The manual identifies the principles, organizational structures, facilities, and procedures to be used by major command communications-electronics (C-E) staffs and signal operating units in planning, engineering and control actions that are performed in connection with the installation and operation of tactical communication systems. Functional responsibilities and hierarchical relationships of headquarters and units are defined and doctrinal guidance is provided for effective and responsible management of the tactical communication systems. The systems of primary interest are those providing command and area communications support at division level and above. However, the techniques, methods and procedures that are described may be used advantageously in the planning and control of other tactical systems. The policies and operating procedures described in this manual are sufficiently flexible for a variety of force compositions, in either nuclear or conventional warfare. GRA

N74-27644# National Bureau of Standards, Boulder, Colo. Electromagnetics Div.
A NOTE ON RADIATION PATTERNS OF ARRAY ANTENNAS
Herman V. Cottony 13 Sep. 1973 20 p refs
(PRO-Y-72-860; AF Proj. 5635)
(AD-777836; AFCRL-TR-73-0579; Scientific-B-6) Avail: NTIS CSCL 17B

The radiation patterns of array antennas are usually expressed as an electric field in the form of a polynomial of complex terms with phases presented in exponential form. This form has certain drawbacks from the analytical standpoint and, in practice, results in limiting the analytical study of arrays to symmetric forms. In this note it is demonstrated that the radiation pattern of an array antenna, whether linear or planar, can be expressed in terms of power as a polynomial of real terms. This form of presentation is shown to have certain advantages; an asymmetry in the array, whether in the positions of the elements or in the current distribution or both, has no effect on the form of the polynomial; each term of the polynomial has a readily recognizable physical significance. Some of the characteristics of this form of radiation pattern representation suggest that it may be more suitable for beam shaping and illumination synthesis. Author (GRA)

N74-27645# National Bureau of Standards, Boulder, Colo. Electromagnetics Div.
A NOTE ON RESOLUTION OF RADAR TARGETS IN CLUTTER
Herman V. Cottony 14 Sep. 1973 59 p refs
(PRO-Y-72-860; AF Proj. 5635)
(AD-777837; AFCRL-TR-73-0586; Scientific-B-7) Avail: NTIS CSCL 17/9

The paper describes exploratory work towards resolution of radar returns in clutter which involves the analysis of the frequency spectrum of the return. However, the technique employed makes use of power spectrum without the phase information. GRA

N74-27646# Philco-Ford Corp., Palo Alto, Calif. Western Development Labs. Div.
PERFORMANCE OF SOFT LIMITING PSK AND DPSK SPREAD SPECTRUM SYSTEMS Final Report, Nov. 72 - Oct. 1973
J. J. Jones, J. J. Huang, and W. K. S. Leong Feb. 1974 191 p refs
(Contract F30602-73-C-0075; AF Proj. 4519)
(AD-777897; WDL-TR-5417; RADC-TR-73-421) Avail: NTIS CSCL 17/2

An analytical study and investigation is carried out to model a phase-coded spread-spectrum communication system containing a soft-limiting satellite repeater. Useful mathematical expressions are obtained for the bit error probability for both coherent PSK and differential PSK biphase data modulation combined with phase-coded biphase or quadriphase spread-spectrum modulation. A study of soft limiter models is performed, resulting in the selection of the error function amplitude characteristic to represent the soft-limiting repeater nonlinearity. The error function model provides the flexibility to represent all degrees of soft limiting from a linear repeater to a hard-limiter. Included in the study are the effects of both up-link and down-link noise as well as CW jamming at the limiter input. (Modified author abstract) GRA

N74-27647# Collins Radio Co., Dallas, Tex.
PACKET RADIO COMMUNICATIONS, VOLUME 1 Quarterly Report
F. H. Dickson 17 Apr. 1974 172 p refs
(Contract DAHC15-73-C-0192; ARPA Order 2305)
(AD-778344; Rept-523-0699742-001-C3L-Vol-1) Avail: NTIS CSCL 17/2

Three major areas of activities in support of packet radio communications are reported in this document. These are: (1) evaluation and selection of radio link parameters for experimental packet radio system, (2) evaluation and selection of modulation and synchronization methods for experimental system, (3) equipment components analysis. Radio link parameter selection includes frequency range, data rates, antenna type, and expected ranges. Modulation and synchronization evaluation is based on both performance and implementation. Component evaluation consists of technological assessment in surface acoustic wave devices, RF sources, antennas, and microprocessors for packet radio application. (Modified author abstract) GRA

N74-27648# Collins Radio Co., Dallas, Tex.
PACKET RADIO COMMUNICATIONS, VOLUME 2 Quarterly Report
F. H. Dickson 17 Apr. 1974 192 p
(Contract DAHC15-73-C-0192; ARPA Order 2305)
(AD-778345; Rept-523-0699742-001C3L-Vol-2) Avail: NTIS CSCL 17/2

Propagation/noise measurement equipment design data are reported. A brief technical description and detailed design package including schematics and photographs of the propagation/noise measurement equipment are also reported. (Modified author abstract) GRA

N74-27649# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
A SUMMARY OF THE RADAR EQUATIONS AND MEASUREMENT TECHNIQUES USED IN THE SAMS RAIN EROSION PROGRAM AT WALLOPS ISLAND, VIRGINIA AFCRL/SAMS Report No. 1
Vernon G. Plank 25 Jan. 1974 104 p refs
(AF Proj. 8620)
(AD-778095; AFCRL-TR-74-0053; AFCRL-SR-172) Avail: NTIS CSCL 17/9

The radar concepts, definitions, and equations that related to the SAMS rain erosion program at Wallops Island, Virginia, are reviewed. The several radars employed in the program are identified, and their nominal characteristics of usual reference performance are cited. The two methods of calibrating the primary radars are explained, and values of the calibration constants that pertain to the different radars and days of missile launches from 1970 through the spring of 1973 are listed. The particular radar measurements for each of the three SAMS seasons of operations since 1970 are summarized, and plans for the forthcoming 1973-74 season are indicated. An uncertainty analysis presented in an appendix permits assessment of the error bounds of the radar reflectivity factors for water and ice hydrometeors, providing that additional special data are obtained for individual Wallops storms. Author (GRA)

N74-27650# Radio Corp. of America, Somerville, N.J. Advanced Communications Lab.
ADVANCED MICROWAVE COMMUNICATIONS TECHNIQUES STUDY. TASK REPORT NO. 1: MIC MODULES INTEGRATION AND SYSTEMS STUDIES
22 Feb. 1973 61 p refs
(Contract N00039-70-C-3541)
(AD-778352) Avail: NTIS CSCL 17/2

The report covers work done to develop up converter, down

converter, and receiver front-end subassemblies. It also covers the investigation of diversity and modulation techniques. GRA

N74-27651# Radio Corp. of America, Somerville, N.J. Advanced Communications Lab.
ADVANCED MICROWAVE COMMUNICATIONS TECHNIQUES STUDY. TASK REPORT NO. 2: SYSTEM TRADE OFFS AND OPTIMIZATION AND ADVANCED TERMINAL DEFINITION
Dec. 1973 225 p
(Contract N00039-70-C-3541)
(AD-778353) Avail: NTIS CSCL 17/2

The work includes: diversity techniques; modulation techniques; reliability, availability and maintainability considerations; review of RF power availability and efficiency; summary of low noise amplifier performance; antenna structure; system optimization trade-off including life cycle cost; and defining an optimum tactical microwave and tropo terminal. GRA

N74-27652# Armament Development and Test Center, Eglin AFB, Fla.
VECTOR METHOD FOR TRILATERATION
James T. Hall Dec. 1973 26 p refs
(AF Proj. 9993)
(AD-777917; ADTC-TR-73-116) Avail: NTIS CSCL 17/9

A vector method is presented for determining spatial position of one or more objects with range-only information from three noncollinear stations. An error analysis shows the dependence of spatial position uncertainty on the geometry of the measurement array. Author (GRA)

N74-27653# National Bureau of Standards, Boulder, Colo. Electromagnetics Div.
A NOTE ON MEASUREMENT OF MULTI-COMPONENT FIELDS
Herman V. Cottony 15 Sep. 1973 34 p refs
(Contract PRO-Y-72-860)
(AD-777880; Scientific-B-8; AFCRL-TR-73-0306) Avail: NTIS CSCL 20/14

The paper considers a propagation model where a signal is propagated via M paths with each component arriving on a horizontal plane from different directions. The M components have random phases, but are coherent with each other. An expression, in the form of a polynomial of complex terms, is derived for the total field strength over the site. By multiplying this polynomical by another with identical but conjugate terms, a polynomial of real terms is obtained; it represents the field intensity distribution and consists of a constant term plus a series of sinusoidal periodicities. (Modified author abstract) GRA

N74-27654# Naval Underwater Systems Center, New London, Conn.
FARFIELD EXTREMELY LOW FREQUENCY PROPAGATION MEASUREMENTS, MAY 1972
Peter R. Bannister, J. Robert Katan, Edwin A. Wolkoff, and William A. Kraimer 2 Apr. 1974 33 p refs
(NUSC Proj. A-590-00)
(AD-778328; NUSC-TR-4675) Avail: NTIS CSCL 17/2

From 1-19 May 1972, the New London Laboratory of the Naval Underwater Systems Center measured farfield, extremely low frequency (ELF) horizontal magnetic field strengths in Anchorage, Alaska, and Sondre, Greenland. At the same time, MIT Lincoln Laboratory measured field strengths in Norway, Greece, and Saipan. At each location, the horizontal magnetic field strengths were measured in bands of frequencies centered at 45 Hz and 75 Hz to determine the average attenuation rates and relative excitation factors for daytime propagation. The U. S. Navy ELF Wisconsin Test Facility was the transmitter. The principal conclusion from these measurements is that auroral-zone effects are present at extremely low frequencies. Author (GRA)

N74-27655# Raytheon Co., Wayland, Mass. Communications System Lab.
RF WIDEBAND DATA TERMINAL Final Technical Report, Apr. 1972 - Aug. 1973
C. K. H. Tsao and E. M. Perdue Feb. 1974 112 p refs
(Contract F30602-72-C-0291; AF Proj. 6523)
(AD-778103; ER73-4308; RADC-TR-74-21) Avail: NTIS CSCL 17/2

The rf wideband data terminal study considers the most suitable design approach to a solid-state device which enables a high-speed digital data stream, at rates up to 500 Mb/s, to be modulated onto a carrier frequency in the EHF government communication bands from 10-300 GHz. The EHF propagation channel is examined. Solid-state component technology is evaluated to assess feasibility. Trade-off considerations are presented which result in a recommended design concept employing differentially coherent FM-PSK modulation systems. Author (GRA)

N74-27656# Syracuse Univ., N.Y. Dept. of Electrical and Computer Engineering.
PROGRAMS FOR ANALYSIS OF RADIATION BY LINEAR ARRAYS OF VERTICAL WIRE ANTENNAS OVER IMPERFECT GROUND
Bradley J. Strait, Tapan Sarkar, and Dah-Cheng Kuo 15 Jan. 1974 57 p refs
(Contract F19628-73-C-0047; AF Proj. 5635)
(AD-777887; SR-4; AFCRL-TR-74-0042) Avail: NTIS CSCL 09/5

Two user-oriented computer programs are presented and described for analyzing radiation from linear arrays of vertical thin-wire antennas over the horizontal plane surface of an imperfectly conducting earth. The first program can handle arbitrary excitation of the array wire, although it is assumed they are equally spaced and all of the same length and radius. The second program is equipped to treat unequally spaced arrays of wires that can be of different lengths and radii, but it is assumed the wires are all centerfed. Both assume the wires are unloaded and that the conductivity of the earth is finite. The effects of the imperfectly conducting earth are accounted for approximately by using the method of reflection coefficients. Computed output consists of current distributions, input impedances, and far-field patterns specified by the user. Author (GRA)

N74-27657# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
PERFORMANCE OF A MICROWAVE ANTENNA SYSTEM IN THE SHOULDER REGION OF A BLUNT REENTRY NOSE CONE Interim Report
J. Leon Poirier, John D. Antonucci, and David H. Tropea 12 Dec. 1973 45 p refs
(AF Proj. 4642)
(AD-777828; AFCRL-TR-73-0656, AFCRL-PSRP-570) Avail: NTIS CSCL 16/3

The purpose of the third AFCRL Trailblazer II reentry vehicle flight was to study the effects of shock ionized air on the performance of a microwave antenna system located in the expansion region of the nose cone. The system consisted of a pair of cavity-backed circumferential slot antennas mounted one behind the other on the conical afterbody of the reentry vehicle. During reentry, measurements of antenna impedance mismatch, interantenna coupling, signal attenuation and antenna pattern distortion were made. The data have been compared with computed values and found to be in good agreement. This experiment thus establishes the validity of the various microwave and flow field models and calculations used to obtain the theoretical values in the shoulder region of the reentry body. These results will now serve as a standard against which to compare the properties of various chemical alleviants which are being studied in other flights. Author (GRA)

N74-27658# Naval Research Lab., Washington, D.C.
CIRCUIT IMPLEMENTATION OF SPEARMAN RHO RANK DETECTOR FOR SCANNING RADARS Interim Report
B. H. Cantrell 29 Mar. 1974 7 p
(AD-778003; NRL-7699) Avail: NTIS CSCL 17/9

A simple algorithm and circuit is devised for computing the Spearman rho test statistic used in detecting targets by scanning radars. The circuit requires (n - 1) comparators, (n + 1) adders, n multipliers, (n - 1) one-bit shift registers of average length (n - 1)/2 and a shift register of length n where n is the number of radar sweeps incorporated in the test. Author (GRA)

N74-28275* Kanner (Leo) Associates, Redwood City, Calif.
ELECTROMAGNETIC PROCESSES IN THE ATMOSPHERE OF PULSARS
A. K. Yukhimuk *In its* Space Res. in the Ukraine, No. 3. (NASA-TT-F-15537) May 1974 p 44-53 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 31-36 (For availability see N74-28272 17-30)
CSCL 20N

N74-28285* Kanner (Leo) Associates, Redwood City, Calif.
INTERMEDIATE MEMORY DEVICES
G. V. Basalayev, A. B. Kmet, M. A. Rakov, and V. A. Tarasevich *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 155-162 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 101-106 (For availability see N74-28272 17-30)
CSCL 17B

08 COMPUTERS

Includes computer operation and programming; and data processing. For applications, see specific categories. For related information see also: 19 Mathematics.

N74-27659*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif. Advance Information Systems.
COMPILER WRITING SYSTEM DETAIL DESIGN SPECIFICATION. VOLUME 1: LANGUAGE SPECIFICATION
W. J. Arthur Apr. 1974 101 p
(Contract NAS8-27202)
(NASA-CR-120263; MDC-G5359-Vol-1) Avail: NTIS HC $8.25 CSCL 09B

Construction within the Meta language for both language and target machine specification is reported. The elements of the function language as a meaning and syntax are presented, and the structure of the target language is described which represents the target dependent object text representation of applications programs. Author

N74-27660*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
COMPILER WRITING SYSTEM DETAIL DESIGN SPECIFICATION. VOLUME 2: COMPONENT SPECIFICATION
W. J. Arthur Apr. 1974 259 p ref 2 Vol.
(Contract NAS8-27202)
(NASA-CR-120264; MDC-G5359-Vol-2) Avail: NTIS HC $16.00 CSCL 09B

The logic modules and data structures composing the Meta-translator module are desribed. This module is responsible for the actual generation of the executable language compiler as a function of the input Meta-language. Machine definitions are also processed and are placed as encoded data on the compiler library data file. The transformation of intermediate language in target language object text is described. Author

N74-27661*# Leach Corp., Azusa, Calif. Controls Div.
HIGH BIT RATE MASS DATA STORAGE DEVICE Final Report
23 Feb. 1973 168 p
(Contract NAS8-28959)
(NASA-CR-120302; TM-329-165) Avail: NTIS HC $11.50 CSCL 09B

The HDDR-II mass data storage system consists of a Leach MTR 7114 recorder reproducer, a wire wrapped, integrated circuit flat plane and necessary power supplies for the flat plane. These units, with interconnecting cables and control panel are enclosed in a common housing mounted on casters. The electronics used in the HDDR-II double density decoding and encoding techniques are described. Author

N74-27662# Joint Publications Research Service, Arlington, Va.
COMPUTERS IN ECONOMICS AND SCIENTISTS OF THE FUTURE
7 Jun. 1974 15 p refs Transl. into ENGLISH from the publ. "Budushcheye Nauki" Moscow, Znaniye, 1972 p 11-28 (JPRS-62194) Avail: NTIS HC $4.00

A government wide automated control system and the scientific worker of the future are considered. For individual titles, see N74-27663 through N74-27664.

N74-27663 Joint Publications Research Service, Arlington, Va.
GOVERNMENT-WIDE AUTOMATED CONTROL SYSTEM
N. P. Fedorenko *In its* Computers in Economics and Scientists of the Future (JPRS-62194) 7 Jun. 1974 p 1-6 ref Transl. into ENGLISH from the publ. "Budushcheye Nauki" Moscow, Znaniye, 1972 p 11-18 (For availability see N74-27662 17-08)

The basic direction of this investigation is the application of mathematical methods and computers to economic research and optimal planning and control of the national economy and its individual links. Author

N74-27664 Joint Publications Research Service, Arlington, Va.
THE SCIENTIFIC WORKER OF THE FUTURE
N. A. Dollezhal and Yu. I. Koryakin *In its* Computers in Economics and Scientists of the Future (JPRS-62194) 7 Jun. 1974 p 7-13 ref Transl. into ENGLISH from the publ. "Budushcheye Nauki" Moscow, Znaniye, 1972 p 19-28 (For availability see N74-27662 17-08)

Design of power installations and technical economic research in the field of power equipment are considered. Author

N74-27665*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTRODUCTION TO COMPUTER IMAGE PROCESSING
Johannes G. Moik (Computer Sciences Corp.) Oct. 1973 68 p refs Original contains color illustrations
(NASA-TM-X-70689; X-650-73-287) Avail: NTIS HC $6.50 CSCL 09B

Theoretical backgrounds and digital techniques for a class of image processing problems are presented. Image formation in the context of linear system theory, image evaluation, noise characteristics, mathematical operations on image and their implementation are discussed. Various techniques for image restoration and image enhancement are presented. Methods for object extraction and the problem of pictorial pattern recognition and classification are discussed. Author

N74-27666# Joint Publications Research Service, Arlington, Va.
ASVT-M CONTROL COMPUTER COMPLEXES AND THE FUTURE OF THEIR DEVELOPMENT
B. N. Naumov 17 Jun. 1974 8 p Transl. into ENGLISH from Prib. Sist. Upr. (Moscow), no. 4, 1974 p 4-5 (JPRS-62257) Avail: NTIS HC $4.00

The ASVT-M control computer systems and their future development are discussed. Firmed-up development plans for the systems for 1975 through 1980 are presented. Author

N74-27667*# Utah Univ., Salt Lake City. Dept. of Electrical Engineering.
DERIVATIVE INFORMATION RECOVERY BY A SELECTIVE INTEGRATION TECHNIQUE Interim Report
Marc A. Johnson May 1974 116 p refs
(Grant NGL-45-003-025)
(NASA-CR-138800; UTEC-MR-74-063) Avail: NTIS HC $9.00 CSCL 09B

A nonlinear stationary homogeneous digital filter DIRSIT (derivative information recovery by a selective integration technique) is investigated. The spectrum of a quasi-linear discrete describing function (DDF) to DIRSIT is obtained by a digital measuring scheme. A finite impulse response (FIR) approximation to the quasi-linearization is then obtained. Finally, DIRSIT is compared with its quasi-linear approximation and with a standard digital differentiating technique. Results indicate the effects of DIRSIT on a wide variety of practical signals. Author

N74-27668*# Rice Univ., Houston, Tex. Inst. for Computer Services and Applications.
ERROR DETECTION AND DATA SMOOTHING BASED ON LOCAL PROCEDURES
Victor M. Guerra May 1974 61 p refs Sponsored in part by

ONR
(Contract NAS9-12776; NR Proj. 042-283)
(NASA-CR-134311; Rept-275-025-012) Avail: NTIS HC $6.25 CSCL 09B

An algorithm is presented which is able to locate isolated bad points and correct them without contaminating the rest of the good data. This work has been greatly influenced and motivated by what is currently done in the manual loft. It is not within the scope of this work to handle small random errors characteristic of a noisy system, and it is therefore assumed that the bad points are isolated and relatively few when compared with the total number of points. Motivated by the desire to imitate the loftsman a visual experiment was conducted to determine what is considered smooth data. This criterion is used to determine how much the data should be smoothed and to prove that this method produces such data. The method utimately converges to a set of points that lies on the polynomial that interpolates the first and last points; however convergence to such a set is definitely not the purpose of our algorithm. The proof of convergence is necessary to demonstrate that oscillation does not take place and that in a finite number of steps the method produces a set as smooth as desired. Author

N74-27669# RAND Corp., Santa Monica, Calif.
SOVIET CYBERNETICS REVIEW. VOLUME 4, NUMBER 1, JANUARY/FEBRUARY 1974
Wade B. Holland Feb. 1974 62 p
(AD-777323/7; R-1500/1-Vol-4-No-1) Avail: HC RAND Corp., 1700 Main St., Santa Monica, Calif. 90406. Publ. Dept. $2.00. Subscriptions $48/year CSCL 09/2

Contents: Progress of nationwide data system; Process control: M-4030 computer links ASVT to ES; Process control-retooling for ASVT production; Process control-concern of ES chief designers; Automation leave GUM in the lurch; Referat information retrieval systems; Brief look at typical management systems; Automated design documentation system; Computerized restaurant comes to Moscow; System will control metals distribution; The computer that reads Lermontov; Science's growing pains in the Far East; and Retooling education for new technologies. GRA

N74-27670# Illinois Univ., Urbana. Coordinated Science Lab.
A GENERAL ALGORITHM FOR THE REALIZATION OF MULTIPLE FAULT DETECTABLE NETWORKS M.S. Thesis
John Lawrence Taska Sep. 1973 73 p refs
(Contract DAAB07-72-C-0259)
(AD-777609; R-626; UILU-ENG-73-2228) Avail: NTIS CSCL 09/2

The study of fault diagnosis of digital systems has been steadily gathering momentum for the past decade. Recently there have been several successful attempts to identify and characterize diagnostically desirable structures which may be worked into the system during the design phase. Of particular interest are the system design rules developed by Schertz and Metze for the generation of combinational networks with desirable diagnostic qualities. These design rules call for the system to be designed using particular structural blocks called restrictive fanout-free networks. The most general form of such a network is called an extended cascade. Networks designed in such a manner have the important property that any complete single fault test set (CSFTS) will necessarily detect all possible multiple faults which may occur. It is the purpose of this report to present a heuristic for the realization of single and multiple output extended cascade networks together with an algorithm for the generation of a CSFTS for these networks that is also a complete multiple fault test set (CMFTS). GRA

N74-27671# Illinois Univ., Urbana. Coordinated Science Lab.
COMPARISON OF DIRECT AND CASCADE FORM REALIZATIONS FOR NONRECURSIVE DIGITAL FILTERS M.S. Thesis
George Edwin Peo, Jr. Sep. 1973 42 p refs
(Contract DAAB07-72-C-0259)
(AD-777608; R-621; UILU-ENG-73-2223) Avail: NTIS CSCL 09/2

It was shown that the cascade form could be implemented with the same number of delays, adders and multipliers as the direct form filter. Several examples were given to show the advantages and disadvantages of both forms. Which form should be implemented depends on the requirements of the application, but the cascade form was shown to be a suitable alternative to the direct form for the realization of nonrecursive digital filters. GRA

N74-27672# Illinois Univ., Urbana. Coordinated Science Lab.
DESIGN OF A FAULT-TOLERANT ASYNCHRONOUS SEQUENTIAL MACHINE M.S. Thesis
Yu-Dar Fan Sep. 1973 52 p refs
(Contract DAAB07-72-C-0259)
(AD-777603; R-627; UILU-ENG-73-2229) Avail: NTIS CSCL 09/2

The design of a fault-tolerant asynchronous sequential machine is a very interesting and important subject of current research. The previous works by Sawin et al and Patterson et al are remarkable building blocks toward this direction. It has been established in the thesis that given a flow table describing a machine, the circuit can be constructed in such a way that it is single fault tolerant and indicates invalid state variables by partitioning every pair of k-sets in an input column by at least three state variables. The detection of the completion of the transitions is facilitated by augmenting the given flow table with a spacer input column and using the control of the completion signals. GRA

N74-27673# Air Force Office of Scientific Research, Arlington, Va.
PROCEEDINGS OF A SYMPOSIUM ON THE HIGH COST OF SOFTWARE
Jack Goldberg Sep. 1973 146 p refs Conf. held at Monterey, Calif., 17-19 Sep. 1973
(AD-777121) Avail: NTIS CSCL 09/2

The Monterey Symposium on the High Cost of Software was held in September 1973, under the joint sponsorship of the Air Force Office of Scientific Research, the Army Research Office, and the Office of Naval Research. The objective of the symposium was to consider what research is needed to achieve a major reduction in software costs. Attendance was by invitation. The 97 attendees were organized in five workshops. The attendees were in strong agreement that direct and indirect software costs are unnecessarily high and are growing rapidly, that they constitute a serious limitation on the effectiveness of information-processing systems, and that the high cost is a consequence of the poor state-of-the-art of software design, production, and maintenance. There was a strong feeling of urgency that an energetic program of research be undertaken to advance the software art. The workshop discussions resulted in two sets of recommendations for a service-supported research program. (Modified author abstract) GRA

N74-27674# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PATTERN RECOGNITION OF LOGIC DIAGRAMS M.S. Thesis
Douglas A. Naegele Dec. 1973 156 p refs
(AD-777267; GE/EE/73A-19) Avail: NTIS CSCL 09/2

This paper presents the development of line following and line analysis pattern recognition routines to automatically computer read hand-drawn logic diagrams. The decision criterion used was based on a tree analysis of segmented lines. The logic diagrams were drawn with a flair pen and the computer program analyzed gates and Flip-Flops within squares ranging from 1/2 inch to 3 inch in size. All four orientations of the six major logical functions were investigated along with 16 different versions of a J-K Flip-Flop. The output of the program is a series of statements which describe the relationships Gates and Flip-Flops have with each other within a logic diagram. These statements are presented in a form suitable as input statements for a developed Digital Logic Similation program used at the Air Force Institute of Technology. (Modified author abstract) GRA

N74-27675# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ALGORITHM STAGE IN FORMALIZED RELIABILITY DESIGNING OF DIGITAL COMPUTER
I. V. Safonov 2 Apr. 1974 22 p refs Transl. into ENGLISH from Upravlyayushchie Sistemy i Mashiny (USSR), no. 1, Sep.

Oct. 1972 p 97-103
(FTD Proj. T74-05-12)
(AD-777658; FTD-HT-23-543-74) Avail: NTIS CSCL 09/2

The method of quasi-local formalized reliability planning for a digital computer is discussed. The computer has structural fixing of programs in the algorithm stage. The algorithm stage is broken down into two substages; program stage and microprogram stage. A classification is proposed for the methods of reliability synthesis. The language of the microprogram algebras used in the real-work part is described. Various formulations of the reliability planning problem are proposed depending on the optimality criterion and limitations imposed by the conditions of planning, preparing, and using the digital computer. Author

N74-27676# Veterans Administration Hospital, Sepulveda, Calif. Biomedical Engineering and Computing Center.
ELECTRONIC CALCULATORS Final Report
Erich A. Pfeiffer Dec. 1973 127 p ref
(PB-227015/5; BECC-73-1) Avail: NTIS HC $10.00 CSCL 09B

Operating principles of electronic calculators are described and discussed, beginning with the simplest types and proceeding to the largest calculator systems. Instead of discussing specific calculator models, the basic principles of various generic types are covered along with the advantages and disadvantages of different approaches in a general way. Programming methods used for various classes of programmable calculators is included. GRA

N74-27677# California Univ., Los Angeles. School of Engineering and Applied Science.
FAULT DETECTION AND RECOVERY IN A REDUNDANT COMPUTER USING STANDBY SPARES
David A. Rennels Jul. 1973 345 p
(Grant NSF GJ-33007)
(PB-226948/8; UCLA-ENG-7355;
NSF/OCA-GJ33007X-73553) Avail: NTIS HC $20.25 CSCL 09B

The implementation of fault detection and recovery algorithms within dynamically redundant computers is reviewed, along with verification of their effectiveness through mathematical reliability modeling and experimental performance measurement. A generalized model of a hard core monitor unit is presented which is responsible for fault detection, diagnosis, and recovery in such a system, and is used as a vehicle to examine (1) concurrent detection and diagnosis of faults in the computer system, (2) recovery of both hardware and software from these faults, and (3) to predict the reliability of dynamically redundant computer systems, based on the effectiveness of the fault detection and recovery mechanisms, and was impelemented as a set of computer programs - the RMS reliability modeling system. GRA

N74-27678# General Electric Co., Schenectady, N.Y. Tube Products Dept.
DESIGN, FABRICATION AND EVALUATION OF AN ELECTRON BEAM ADDRESSABLE HIGH INFORMATION DENSITY MEMORY TUBE Quarterly Report, 1 Aug. - 31 Oct. 1973
James K. Fisher and Charles Q. Lemmond Mar. 1974 24 p
(Contract DAAB07-72-C-0098; DA Proj. 1H6-31024-D-252)
(AD-778154; GE-SRD-73-115; ECOM-0098-7-72; QR-7) Avail: NTIS CSCL 09/2

The cause of high O response was determined and methods to eliminate this problem have been developed. Testing of BEAMOS tube No. 7 shows a capability of 5.6 in bit spacing at a 10 mb/sec readout rate for an overall storage capacity of 1.7 x 10 to the 7th power bits. A preliminary demonstration of BEAMOS system operation involving a data link between two buildings, 10 miles apart, was held. This test demonstrated total digital in and digital out operation of the Memory Test System. Author (GRA)

N74-27679# Illinois Univ., Urbana. Dept. of Computer Science.
OPTIMAL NETWORKS WITH NOR-OR GATES AND WIRED OR LOGIC M.S. Thesis
Tsuneo Kawasaki Jan. 1974 104 p refs
(Grant NSF GJ-40221)
(PB-228474/3; UIUCDCS-R-74-623) Avail: NTIS HC $8.25 CSCL 09B

Generally, emitter coupled logic (ECL) gates have dual outputs (i.e., NOR-OR) and the outputs of two or more ECL gates can be tied together to realize OR functions without extra gates. This is called wired-OR. Using gates with dual outputs and wired-ORs, an algorithm to get the optimal networks, i.e., those which have a minimum number of NOR-OR gates and, as the secondary objective, a minimum number of connections, for a given arbitrary function, is discussed, under the assumption that only non-complimented variables are available as the network inputs. Only NOR-OR gates are used in these networks, but this algorithm can also be applied to networks with NAND-AND gates and wired-ANDs. (Modified author abstract) GRA

N74-27680# Iowa State Univ. of Science and Technology, Ames. Cyclone Computer Lab.
PROGRAM EXECUTION IN THE SYMBOL 2R COMPUTER
Perry Hutchinson and Karen Ethington Oct. 1973 10 p refs
Presented at Symp. on the High-Level Language Computer Architecture, College Park, Md., Nov. 1973
(Grant NSF GJ-33097)
(PB-228780/3; ISU-CCL-7309; NSF-OCA-GJ33097-CL7309)
Avail: NTIS HC $3.00 CSCL 09B

The direct hardware implementation of the SYMBOL programming language (SPL) is highly dependent on an unusually powerful central processor (CP). The principal features of the CP's operations in executing SPL programs are described. GRA

09 ELECTRONIC EQUIPMENT

Includes electronic test equipment and maintainability; component parts, e.g., electron tubes, tunnel diodes, transistors; integrated circuitry; microminiaturization. For basic research see: 10 Electronics. For related information see also: 07 Communications and 21 Navigation.

N74-27681 Cornell Univ., Ithaca, N.Y.
GaAs SCHOTTKY BARRIER AVALANCHE DIODES Ph.D. Thesis
Nils-Olov Johnson 1973 174 p
Avail: Univ. Microfilms Order No. 74-10190

Gallium arsenide Schottky barrier IMPATT diodes were constructed and tested. The epitaxial material used in the active part of the diode was grown by liquid phase epitaxy (LPE) with a limited source. A platinum Schottky barrier was used and the diode chips were thermocompression bonded to a gold plated heat sink. The maximum output power from these diodes was 100 mW. at 8.66 GHz and 800 mW pulsed at 11.95 GHz. The highest efficiency obtained was 10% for pulsed operation. A versatile theoretical model was developed and applied to the analysis of these diodes. The results from this analysis were compared with impendance measurements on the diodes and the experimental and theoretical results were found to agree.
Dissert. Abstr.

N74-27682* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PHOTOMULTIPLIER CIRCUIT INCLUDING MEANS FOR RAPIDLY REDUCING THE SENSITIVITY THEREOF Patent
James O. McClenahan, inventor (to NASA) Issued 28 Jun. 1974 4 p Filed 28 Nov. 1972 Supersedes N73-30187 (11 - 21, p 2517)
(NASA-Case-ARC-10593-1; US-Patent-3,821,546;
US-Patent-Appl-SN-310193; US-Patent-Class-250-207;
US-Patent-Class-307-252L; US-Patent-Class-307-252Q) Avail: US Patent Office CSCL 09A

A simple, reliable and inexpensive control circuit is described for rapidly reducing the bias voltage across one or more of the dynode stages of a photomultiplier, to substantially decrease its sensitivity to incoming light at those times where excess light intensity might damage the tube. The control circuit comprises a switching device, such as a silicon controlled rectifier (SCR), coupled between a pair of the electrodes in the tube, preferably the cathode and first dynode, or the first and second dynodes, the switching device operating in response to a trigger pulse

applied to its gate to short circuit the two electrodes. To insure the desired reduction in sensitivity, two switching stages, the devices be employed between two of the electrode stages, the devices being operated simultaneously to short circuit both stages. Official Gazette of the U.S. Patent Office

N74-27683* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HIGH CURRENT ELECTRICAL LEAD Patent
Warner B. Kaufman and Roland Breitwieser, inventors (to NASA) Issued 28 Jun. 1974 4 p Filed 19 Jul. 1972 Supersedes N72-31239 (10 - 22, p 2939)
(NASA-Case-LEW-10950-1; US-Patent-3,821,462; US-Patent-Appl-SN-273222; US-Patent-Class-174-15C; US-Patent-Class-174-28; US-Patent-Class-174-111; US-Patent-Class-310-4R) Avail: US Patent Office CSCL 09E

An electrical lead has insulators imbedded in an inner conductor rod to form an annulus between the rod and a surrounding outer sheath. This annular space is filled with gas which conducts heat and prevents electrical leakage.
Official Gazette of the U.S. Patent Office

N74-27684*# Bedford Engineering Corp., Mass.
PHOTOMULTIPLIER TUBE RELIABILITY STUDY FOR THE HEAO PROGRAM
Carl Richardson Jan. 1974 65 p
(Contract NAS8-28265)
(NASA-CR-120291) Avail: NTIS HC $6.25 CSCL 09A

Results concerning the research on photomultiplier tubes required for the HEAO program are reported. The general specifications are discussed for providing a series of tests for helping the operational reliability of its application, and for permitting comparison of performance of similar types, from various manufacturers. M.C.F.

N74-27685# Royal Aircraft Establishment, Farnborough (England).
INVESTIGATIONS ON THE READABILITY AND INTERPRETABILITY OF ELECTRONIC DISPLAYS: INVESTIGATIONS ON THE EFFECTIVENESS OF BRIGHTNESS CODING AND COLOUR CODING OF DISPLAY ELEMENTS
R. Beyer, H. D. Schenk, and F. Zietlow Sep. 1973 83 p refs Transl. into ENGLISH from the German report DLR-FB-71-57 (RAE-Lib-Trans-1641; BR37509; DLR-FB-71-57) Avail: NTIS HC $7.25

The coding of display elements in electronic displays is considered. The effectiveness of brightness coding is compared with that of color coding. The experiments carried out within the context of the problem considered here contain the following: (1) A test involving the measurement of reaction speed; (2) a complex tracking problem, (3) a tachistoscopic test; and (4) the gathering of subjective evaluations of various color codings of an experimental electronic display. Author

N74-27686# Royal Aircraft Establishment, Farnborough (England).
THE EXPERIMENTAL CHARACTERISATION AND ANALYSIS OF THE EFFECT OF IONISING RADIATION ON THE ELECTRICAL PROPERTIES OF MOS TRANSISTORS Ph.D. Thesis
J. Buxo Nov. 1973 133 p refs Transl. into ENGLISH from Ph.D. Thesis No. 484, Univ. Paul Sabatier, Toulouse, Apr. 1972 (RAE-Lib-Trans-1691; BR38937) Avail: NTIS HC $9.75

The metal-oxide-semiconductor capacitor and transistor, and the origin of degradation phenomena due to irradiation was studied. Various models of the phenomena are discussed and a new model is proposed. The models are compared with experimental results for transistor hardening procedures involving a thin metallic interlayer in the oxide. Thermal curing of irradiation damage was also studied. Author

N74-27687*# General Electric Co., Schenectady, N.Y.
DEVELOPMENT AND FABRICATION OF IMPROVED SCHOTTKY POWER DIODES, PHASES I AND II Interim Report
L. F. Cordes, M. Garfinkle, and E. A. Taft 1974 69 p refs
(Contract NAS3-16749)
(NASA-CR-134624; SRD-74-024) Avail: NTIS HC $6.50 CSCL 09A

Reproducible methods for the fabrication of silicon Schottky diodes were developed for the metals tungsten, aluminum, conventional platinum silicide and low temperature platinum silicide. Barrier heights and barrier lowering were measured permitting the accurate prediction of ideal forward and reverse diode performance. Processing procedures were developed which permit the fabrication of large area (approximately 1 sq cm) mesa-geometry power Schottky diodes with forward and reverse characteristics that approach theoretical values. Author

N74-27688*# National Aeronautics and Space Administration. Pasadena Office, Calif.
BRUSHLESS dc MOTOR WITH WOUND ROTOR Patent Application
Edmund J. Bahm, inventor (to NASA) (JPL) Issued 12 Jun. 1974 14 p
(Contract NAS7-100)
(NASA-Case-NPO-13437-1; US-Patent-Appl-SN-478801) Avail: NTIS HC $4.00 CSCL 09A

A brushless dc motor is disclosed in which the rotor is an electromagnet energized through a transformer having its primary winding stationary on the stator, and its secondary winding mounted on the rotor. Controlled dc current applied to the motor is converted to ac current for inductive coupling to the rotating secondary winding. The ac current in the secondary winding is rectified to provide dc current to the rotor field coil. NASA

N74-27689*# National Aeronautics and Space Administration. Pasadena Office, Calif.
REFRIGERATED COAXIAL COUPLING Patent Application
Robert C. Clauss (JPL) and Ervin R. Wiebe, inventors (to NASA) (JPL) Issued 27 Jun. 1974 15 p
(Contract NAS7-100)
(NASA-Case-NPO-13504-1; US-Patent-Appl-SN-483852) Avail: NTIS HC $4.00 CSCL 09A

A transmission line is reported for improving the sensitivity of a maser or other microwave processing equipment. A cooled coaxial line is used for coupling a waveguide to a refrigerated maser, wherein the central coaxial conductor has an outer end projecting into the waveguide and is covered by a quartz dome. The space between the central and outer conductors of the coaxial line is evacuated to minimize heat transfer. The central coaxial conductor is supported by the outer conductor at only its inner end which is refrigerated to less than 5 deg Kelvin. The central coaxial conductor is a short solid copper rod to maintain even the outer end at a low temperature. NASA

N74-27690*# National Aeronautics and Space Administration. Pasadena Office, Calif.
DICHROIC PLATE Patent Application
Philip D. Potter, inventor (to NASA) (JPL) Issued 27 Jun. 1974 13 p
(Contract NAS7-100)
(NASA-Case-NPO-13506-1; US-Patent-Appl-SN-483851) Avail: NTIS HC $4.00 CSCL 09A

A dichroic plate is disclosed for passing radiation within a particular frequency band and reflecting radiation outside of that frequency band. The value of the thickness of the plate is selected so that the plate acts as a resonant narrow band pass filter for the desired pass frequency, and the shapes of the apertures in the dichroic plate are selected to compensate for the phase shift caused by the air plate interface presented to the signals passing therethrough. NASA

N74-27691*# Ohio State Univ., Columbus. ElectroScience Lab.
SINUSOIDAL REACTION FORMULATION FOR RADIATION AND SCATTERING FROM CONDUCTING SURFACES Progress Report
J. H. Richmond and N. Wang Jun. 1974 33 p refs
(Grant NGL-36-008-138)
(NASA-CR-2398; TR-2902-11) Avail: NTIS HC $4.75 CSCL 17B

The piecewise-sinusoidal reaction technique was developed for low-frequency scattering and radiation from perfectly conducting bodies of arbitrary shape. The theory and numerical

results for scattering patterns of rectangular plates and radiation patterns of corner-reflector antennas are presented. Author

N74-27692# Gosudarstvennyi Komitet po Ispolzovaniyu Atomnoi Energii, Moscow (USSR). Inst. Teoreticheskoj i Ehksperimentalnoj Fiziki.
INVESTIGATION OF THE RE-ESTABLISHMENT OF IMPULSE ELECTRICAL STRENGTH AFTER DISCHARGE IN SPARK CHAMBERS WITH SMALL CLEARANCE
V. I. Martynov and V. V. Ryltsov 1973 24 p refs In RUSSIAN
(ITEF-25) Avail: AEC Depository Libraries HC $3.25

The curves for the re-establishment of the impulse electrical strength, measured at two different electrode clearances (1.0 and 0.6 cm), are reported as a function of the electrical conditions and the composition of the gaseous mixture at atmospheric pressure. The spark chamber was filled with Ne-He, Ne, or He with admixtures of several percent of ethyl alcohol, isopropyl alcohol, and 0.01% Freon-12 vapors. The interpretation of the results was done by analogy with the interpretation of processes occurring the usual gas-discharge counters in post-discharge period. Author (NSA)

N74-27693# Microwave Associates, Inc., Burlington, Mass.
OCTAVE-BANDWIDTH, HIGH DIRECTIVITY MICROSTRIP COUPLERS Final Report, 17 Mar. 1972 - 30 Jun. 1973
Charles Buntschuh Jan. 1974 218 p refs
(Contract F30602-72-C-0282)
(AD-777320; RADC-TR-73-396) Avail: NTIS CSCL 09/1

The purpose of the study was to examine techniques of velocity compensation, broadbanding, and tight coupling, and combine them to produce high-directivity, broad band microstrip couplers from 3 to 20 db. A further objective was to develop a design procedure, with supporting tables and charts, to facilitate the rapid design of microstrip couplers and to verify the procedure experimentally. (Modified author abstract) GRA

N74-27694# Case Western Reserve Univ., Cleveland, Ohio. Electrochemistry Research Lab.
EFFECT OF BORON ADDITION ON THE DIFFERENTIAL CAPACITANCE OF STRESS-ANNEALED PYROLYTIC GRAPHITE Technical Report No. 36
Jean-Paul Randin and Ernest Yeager 1 Mar. 1974 25 p refs
(Contract N00014-67-A-0404-0006; NR Proj. 359-451)
(AD-777116; TR-36) Avail: NTIS CSCL 09/1

The non-faradaic differential electrode capacity of the basal plane of boronated stress-annealed pyrolytic graphite with 0.3 weight % boron was studied in aqueous solution using an a.c impedance bridge and compared to results previously obtained on the non-boronated material. On boronated graphite the potential of the minimum in the capacity-potential curve shifts negative by about 0.5 V relative to that for the non-boronated material. This shift is in agreement with the semiconductor interpretation proposed previously for the capacitance of the basal plane of the non-boronated material. The capacity of the minimum for the boronated material compared favorably with that estimated from the carrier concentration for the space charge region in the electrode phase. (Modified author abstract) GRA

N74-27695# Cornell Univ., Ithaca, N.Y. School of Electrical Engineering.
ADVANCED CONCEPTS OF MICROWAVE GENERATION AND CONTROL IN SOLIDS Quarterly Progress Report, 1 Apr. - 30 Jun. 1973
G. C. Dalman, L. F. Eastman, C. A. Lee, and J. Frey Feb. 1974 120 p refs
(Contract F30602-71-C-0110; AF Proj. 5573)
(AD-777815; RADC-TR-74-5; QPR-11) Avail: NTIS CSCL 09/1

Contents: Multi-mesa TRAPATT fabrication, high frequency high efficiency avalanche oscillations, computer aided analysis of Schottky barrier BARITT diodes, BARITT devices, microwave transistor studies, amplifier properties, computer experiments on TRAPATT diodes, C.W. high performance TEO, growth and evaluation of InP for LSA oscillations, automatic capacitance measurement of transit-time avalanche diodes, ion implantation and diffusion, ionization rates in GaAs, vacuum epitaxial growth in silicon. GRA

N74-27696# Hughes Aircraft Co., Torrance, Calif. Electron Dynamics Div.
BROADBAND TRANSMITTER TUBE Triannual Report, 1 Nov. 1973 - 23 Feb. 1974
A. E. Manoly Apr. 1974 22 p refs
(Contract DAAB07-72-C-0294; DA Proj. 150-62102-A-0420129)
(AD-778155; EDD-W-5262-5; ECOM-0294-5-72) Avail: NTIS CSCL 09/1

Dual beam electron gun design studies were completed. The initial design determined in the electrolytic tank and electron trajectories along with beam characteristics were evaluated using a digital computer program. An experimental gun was designed, constructed and evaluated using a demountable electrostatic beam analyzer. Experimentally measured beam characteristics were found to be similar to theoretically predicted values. Circuit match studies were conducted. (Modified author abstract) GRA

N74-27697# Cornell Univ., Ithaca, N.Y. School of Electrical Engineering.
MICROWAVE SEMICONDUCTOR DEVICES, CIRCUITS, AND APPLICATION Final Report
Joseph L. Rosson Aug. 1973 84 p refs
(Grant Nonr(G)-00020-73)
(AD-778016) Avail: NTIS CSCL 09/1

The 1973 Conference covered the following topics: Transistors, where the remarkable new GaAs high-frequency field effect transistors were presented; transferred-electron devices and their applications, where the GaAs (and InP) Gunn and related devices as well as the extremely high-frequency computer logic elements were covered; IMPATT devices, where new high-power (8W) C.W. GaAs devices were shown to have high efficiency (35.5%); and TRAPATT devices that have generated high-pulse powers at high efficiencies. GRA

N74-27698# Transportation Systems Center, Cambridge, Mass.
INPUT POWER CHARACTERISTICS OF A THREE-PHASE THYRISTOR CONVERTER Final Report, Jan. - Dec. 1972
Raymand A. Wlodyka, Joseph D. Abbas, and George Ploetz Oct. 1973 90 p refs
(PB-226281/4; DOT-TSC-FRA-73-4; FRA-ORD/D-74-20) Avail: NTIS HC $6.50 CSCL 10B

A phase delay rectifier operating into a passive resistive load was instrumented in the laboratory. Techniques for accurate measurement of power, diplacement reactive power, harmonic components, and distortion reactive power are presented. The characteristics of the phase delay rectifier operating with unfiltered and inductively filtered resistive loads are presented using both derivations and measurements. The changes of the phase delay rectifier characteristics with a free wheeling diode in the circuit are also presented. Author (GRA)

N74-27699# Illinois Univ., Urbana. Coordinated Science Lab.
REPRODUCIBILITY AND FREQUENCY TUNING OF AN INTERDIGITALLY POLED CERAMIC SURFACE ACOUSTIC WAVE TRANSDUCER M.S. Thesis
Nathan Tadayoshi Sakamoto Feb. 1974 55 p refs
(Contract DAAB07-72-C-0259)
(AD-778065; R-639; UILU-ENG-74-2202) Avail: NTIS CSCL 09/1

The concern of this project is for devices operating in the 2-50 MHz range, which includes IF filters for FM and TV receivers. The purpose of this project is to evaluate the reproducibility and tunability of a series of surface acoustic wave transducers which have been produced by identical processing steps on a polycrystalline ceramic substrate. Each transducer is a uniform interdigital array patterned on a substrate of PZT (lead-zirconate-titanate). The degree of reproducibility is investigated. GRA

N74-27700# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering
ELECTRODEVELOPMENT OF HIGH RESOLUTION INTEGRATED CIRCUIT MASKS M.S. Thesis
Gary L. Hoe Dec. 1973 87 p refs
(AD-777861; GE/EE/73A-13) Avail: NTIS CSCL 09/1

The report details an investigation of the electrodevelopment process as applied to mask-making. The process places masks and developer by-products. This method and an older ultrasonic

developer agitation method are compared as to developer concentrations and lifetimes, processing times, exposure values and tolerances to exposure ranges, ability to reproduce sub-micron images, image bloom and pinholing, defect densities, and image density. Electrodevelopment is further characterized for electrode compatibility and cell power requirements. Prototype and final electrodevelopment tanks were designed and integrated with the existing mask-making facility. The final design was successfully demonstrated during the fabrication of a number of integrated circuits. (Modified author abstract) GRA

N74-27701# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
OPTICAL AND ELECTICAL PROPERTIES OF CuGaS2: CdS JUNCTIONS M.S. Thesis
Dennis L. Boesen Feb. 1974 61 p refs
(AD-777840; GEP/PH/74-1) Avail: NTIS CSCL 09/1

Thin films of low resistivity CdS and CuGaS2 have been deposited by flash evaporation onto conductive crystals of CuGaS2 and CdS, respectively. The devices so formed have exhibited good rectifier characteristics at room temperature, and the CdS-on-CuGaS2 devices have exhibited electroluminescence in the green and red at 77K. The devices are believed to be heterojunctions and the green light is believed to originate from electrons injected from the N-type CdS into the P-type CuGaS2. Author (GRA)

N74-27702# General Electric Co., Philadelphia, Pa. Space Div.
VIDICON UNIFORMITY Semiannual Technical Report
James P. Spratt 15 Dec. 1973 19 p refs
(Contract F19628-73-C-0267; AF Proj. 2444)
(AD-777869; AFCRL-TR-74-0016) Avail: NTIS CSCL 09/1

Work was done on developing a theory of high beam velocity operation of a vidicon camera tube. Silicon Schottky diode arrays having low barrier heights (e.g. Pd/P-Si) can be used in such tubes as infrared vidicon retinae. The uniformity of the resultant vidicon should be superior to that afforded by other approaches. A theoretical and experimental study of this uniformity was initiated. Author (GRA)

N74-27703# Ohio State Univ., Columbus. ElectroScience Lab.
SMALL ANTENNAS FOR NOSE TIP APPLICATIONS Final Report, 1 Jun. - 31 Dec. 1973
E. H. Newman, J. H. Richmond, G. K. Chan, and C. H. Walter Apr. 1974 49 p refs
(Contract DAAG39-72-C-0041)
(AD-778204; ESL-3281-5; HDL-TR-041-3) Avail: NTIS CSCL 09/5

Previous work on the characteristics of electrically small antennas, antennas in the tip region of a conical projectile, and antennas in or on a conical projectile is briefly reviewed. Using computer modelling new design data for antennas in the tip region of a conical projectile in the frequency range 500 to 1100 MHz is presented. A loop-dipole combination is used to obtain a cardioid type pattern in the forward hemisphere. (Modified author abstract) GRA

N74-27704# Monsanto Research Corp., Dayton, Ohio.
TAILORED DIELECTRICS Final Report, 31 May 1973 - 28 Feb. 1974
D. H. Harris Apr. 1974 48 p refs
(Contract DAAB07-73-C-0201; DA Proj. 1S7-62705-AH-94)
(AD-777808; ECOM-0201-F-73) Avail: NTIS CSCL 09/5

The overall objective of the study was to investigate the feasibility of depositing beryllia dielectrics and copper RF circuits on a copper substrate by means of the arc plasma spraying process for use in microwave electron tubes. A totally enclosed water-cooled spraying facility was designed and constructed for safe processing of beryllia. The system is operational under inert or oxidizing atmospheres which are continuously filtered and closely monitored for contamination. Operating procedures were developed and used for the plasma spray deposition of beryllia and copper. Studies showed that a high deposition rate of beryllia could be achieved suggesting future economy for beryllia-component fabrication. Two sample RF circuit assemblies were fabricated and delivered to USAECOM for evaluation. Author (GRA)

N74-27710 Joint Publications Research Service, Arlington, Va.
METHOD OF CLOSING AND BREAKING TESTING OF FIELD TRANSISTORS WITH p-n JUNCTION
V. I. Ovcharenko and V. Ye. Sevostyanov *In its* Microcircuits and Field Transistors (JPRS-62192) 7 Jun. 1974 p 11-19 refs Transl. into ENGLISH from Elektron. Tekhn. (Moscow), no. 5, 1972 p 79-85 (For availability see N74-27707 17-10)

10 ELECTRONICS

Includes circuit theory; and feedback and control theory. For applications see: 09 Electronic Equipment. For related information see specific Physics categories.

N74-27705* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DIFFERENTIAL PHASE SHIFT KEYED SIGNAL RESOLVER Patent
Phillip M. Hopkins (Lockheed Electron. Co., Houston, Tex.) and Wally M. Wallingford, inventors (to NASA) (Lockheed Electron. Co., Houston, Tex.) Issued 18 Jun. 1974 10 p Filed 12 Oct. 1972 Supersedes N73-10269 (11 - 01, p 0034) Sponsored by NASA
(NASA-Case-MSC-14066-1; US-Patent-3,818,346;
US-Patent-Appl-SN-297127; US-Patent-Class-325-320;
US-Patent-Class-178-88) Avail: US Patent Office CSCL 09E

A differential phase shift keyed signal resolver resolves the differential phase shift in the incoming signal to determine the data content thereof overcoming phase uncertainty without requiring a transmitted reference signal.
Official Gazette of the U.S. Patent Office

N74-27706 Cincinnati Univ., Ohio.
PHASE CONTROL AND PHASE MINIMIZATION IN DIGITAL FILTERS Ph.D. Thesis
Frank Edward Burris 1974 254 p
Avail: Univ. Microfilms Order No. 74-12454

The phase response of linear, time invariant, stable, realizable digital filters is characterized in the frequency domain as the superposition of the phase effects of each of the elemental factors which constitutes the z transform representation of the filter. This approach to the study of the phase response leads to a simplified presentation of the primary properties of linear phase filters and the establishment of the number of possible phase responses which may be obtained by modification of a filter's zero constellation, with preservation of the original magnitude response. A basic difference between the minimum phase concept in continuous time systems and the minimum phase concept in discrete time systems is exposed. This difference leads to a more precise definition of a stable, minimum phase digital filter as one which has on finite zeros outside the unit circle and a finite pole-zero excess of zero. Dissert. Abstr.

N74-27707# Joint Publications Research Service, Arlington, Va.
MICROCIRCUITS AND FIELD TRANSISTORS
7 Jun. 1974 34 p refs Transl. into ENGLISH from Elektron. Tekhn. (Moscow), no. 5, 1972 24 p
(JPRS-62192) Avail: NTIS HC $4.75

Methods for analyzing failures of hybrid integrated microcircuits and of research on field transistors are outlined. For individual titles, see N74-27708 through N74-27712.

N74-27708 Joint Publications Research Service, Arlington, Va.
ANALYSIS OF FAILURES OF HYBRID INTEGRATED MICROCIRCUITS
V. N. Bryunin, A. A. Ovseytsev, and Ye. M. Ponarovkin *In its* Microcircuits and Field Transistors (JPRS-62192) 7 Jun. 1974 p 1-5 refs Transl. into ENGLISH from Elektron. Tekhn. (Moscow), no. 5, 1972 p 40-43 (For availability see N74-27707 17-10)

A method of analyzing failures of microelectronic products for the purpose of eliminating factors that lead to failure is described. The order in which the analytical procedure should

be done is recommended. An example is given to illustrate the presentation of generalized data on failures of hybrid integrated circuits. Author

N74-27709 Joint Publications Research Service, Arlington, Va.
THE QUALITY OF THERMOCOMPRESSION CONNECTIONS AND MEANS OF IMPROVING THE DEPENDABILITY OF MICROCIRCUITS
F. S. Tsybizov, R. A. Golubenko, M. A. Semenova, and V. G. Mukhin *In its* Microcircuits and Field Transistors (JPRS-62192) 7 Jun. 1974 p 6-10 refs Transl. into ENGLISH from Elektron. Tekhn. (Moscow), no. 5, 1972 p 44-47 (For availability see N74-27707 17-10)

The main causes of failures of SiO2 film-0.04 mm diameter gold wire thermocompression connections are examined. Recommendations are made on improving the reliability of thermocompression connections. Author

N74-27710 Joint Publications Research Service, Arlington, Va.
METHOD OF CLOSING AND BREAKING TESTING OF FIELD TRANSISTORS WITH p-n JUNCTION **c09**
V. I. Ovcharenko and V. Ye. Sevostyanov *In its* Microcircuits and Field Transistors (JPRS-62192) 7 Jun. 1974 p 11-19 refs Transl. into ENGLISH from Elektron. Tekhn. (Moscow), no. 5, 1972 p 79-85 (For availability see N74-27707 17-10)

A method of indicating the closing and breaking of the electrodes of a field transistor with a p-n junction, based on evaluation of the conductivity between the electrodes of a field transistor, operating alternately in the make and break states, is examined. A system for indicating closing and breaking is described and test results are analyzed. Author

N74-27711 Joint Publications Research Service, Arlington, Va.
COMPATIBILITY OF MATERIALS AND DEPENDABILITY OF HYBRID MICROCIRCUITS
N. I. Voronova, V. M. Kalashnikova, V. A. Volkov, and N. N. Ivliyez *In its* Microcircuits and Field Transistors (JPRS-62192) 7 Jun. 1974 p 20-26 refs Transl. into ENGLISH from Elektron. Tekhn. (Moscow), no. 5, 1972 p 92-97 (For availability see N74-27707 17-10)

The causes of failures of frameless semiconductor instruments as a result of change of the initial state of protective coatings of the devices and mechanical breaks beneath the coating of thermocompression connections are analyzed. The effect of polymers that are used in the production of hybrid microcircuits (HM) on the coating of various organic solvents and volatile products is examined. It is shown that the high reliability of HM is guaranteed in cases of the absence of the stated substances inside the sealed bodies of microcircuits. Author

N74-27712 Joint Publications Research Service, Arlington, Va.
READING LIST ON QUALITY CONTROL PROBLEMS **c15**
N. P. Stepanov *In its* Microcircuits and Field Transistors (JPRS-62192) 7 Jun. 1974 p 27-31 refs Transl. into ENGLISH from Elektron. Tekhn. (Moscow), no. 5, 1972 p 109-111 (For availability see N74-27707 17-10)

The practical and economic aspects of quality control in the development of industrial products are considered. G.G.

N74-27713*# Bendix Corp., Ann Arbor, Mich. Aerospace Systems Div.
FEASIBILITY STUDY OF COMMON ELECTRONIC EQUIPMENT FOR SHUTTLE SORTIE EXPERIMENT PAYLOADS Final Report
Jun. 1974 230 p refs
(Contract NAS9-13784)
(NASA-CR-134317; BSR-4142) Avail: NTIS HC $14.50 CSCL 09C

A study was conducted to determine the feasibility of using standardized electronic equipment on the space shuttle vehicle in an effort to reduce the cost estimates. The standards for Nuclear Instrument Modules (NIM) and CAMAC electronic equipment are presented and described. It was determined that the CAMAC electronic equipment was more suitable for use with the space shuttle systems. Specific applications of the CAMAC equipment are analyzed. Illustrations of the equipment and circuit diagrams of the subsystems are provided. Author

N74-27714# Waterloo Univ. (Ontario). Dep. of Electrical Engineering.
A THREE-TERMINAL PIECEWISE-LINEAR MODELLING APPROACH TO dc ANALYSIS OF TRANSISTOR CIRCUITS
Ibrahim N. Hajj, David J. Roulston, and Peter R. Bryant Mar. 1973 46 p refs Sponsored by Natl. Res. Council of Can.
(UWEE/73/3) Avail: NTIS HC $5.50 CSCL 09C

A simulation method is described which generates dc responses (in the form of operating points or transfer characteristics) of integrated circuits directly from physical parameter data. The basis of the method is a two dimensional piecewise-linear approach to the dc modelling of bipolar transistors. The model is directly used in a piecewise-linear circuit analysis program to simulate the dc response of a given circuit. Author

N74-27715*# Santa Clara Univ., Calif.
STEADY-STATE DECOUPLING AND DESIGN OF LINEAR MULTIVARIABLE SYSTEMS Research Report, Jun. 1972 - Jun. 1974
G. J. Thaler Jun. 1974 154 p refs
(Grant NGR-05-017-010)
(NASA-CR-138815) Avail: NTIS HC $10.75 CSCL 09C

A constructive criterion for decoupling the steady states of a linear time-invariant multivariable system is presented. This criterion consists of a set of inequalities which, when satisfied, will cause the steady states of a system to be decoupled. Stability analysis and a new design technique for such systems are given. A new and simple connection between single-loop and multivariable cases is found. These results are then applied to the compensation design for NASA STOL C-8A aircraft. Both steady-state decoupling and stability are justified through computer simulations. Author

N74-27716# Army Communications Command, Fort Huachuca, Ariz.
CONCEPT OF OPERATION FOR USACC ELECTROMAGNETIC COMPATIBILITY PROGRAM (EMCP)
1 Nov. 1973 98 p
(AD-776347; ACC-CCP-105-9) Avail: NTIS CSCL 09/3

The goals of the EMC Program are to: insure efficient integration of engineering, management, and quality assurance tasks, as related to Electromagnetic Compatibility (EMC); insure intrasystem and intersystem design and operational electromagnetic compatibility; insure continuous traceability of EMC requirements and design alternatives throughout the program so that the sources and impact of design changes and deficiencies in equipment and subsystems, and the impact on contractual performance requirements are promptly determined, accurately identified, and properly communicated; permit timely and optimum redefinition of EMC requirements in response to changes resulting from problems identified through performance measurements; and to provide input to, and insure compatibility with, all interfacing management and information systems employed in the project. GRA

N74-27717# Naval Research Lab., Washington, D.C.
AUTO-MODULATION OF AN INTENSE RELATIVISTIC ELECTRON BEAM Final Report
M. Friedman Jan. 1974 11 p refs
(NRL Proj. R08-53)
(AD-775589; NRL-MR-2708) Avail: NTIS CSCL 20/7

A novel method of auto-modulating an intense relativistic electron beam has been demonstrated. The modulation is accomplished by passing the electron beam through a series of cavities that are inserted into a conventional drift tube. Experimental results indicate that the current is modulated at a frequency of 500 MHz at a relative modulation amplitude exceeding 80%. Author (GRA)

11 FACILITIES, RESEARCH AND SUPPORT

Includes airports; lunar and planetary bases including associated vehicles; ground support systems; related logistics; simulators; test facilities (e.g., rocket engine test stands, shock tubes, and wind tunnels); test ranges; and tracking stations.

N74-27718*# General Electric Co., Philadelphia, Pa. Missile and Space Div.
UNIVERSAL COMPUTER TEST STAND (RECOMMENDED COMPUTER TEST REQUIREMENTS)
19 Jan. 1973 197 p
(Contract NAS9-12990)
(NASA-CR-128804; SE-266TA) Avail: NTIS HC $13.00 CSCL 14B

Techniques are considered which would be used to characterize areospace computers with the space shuttle application as end usage. The system level digital problems which have been encountered and documented are surveyed. From the large cross section of tests, an optimum set is recommended that has a high probability of discovering documented system level digital problems within laboratory environments. Defined is a baseline hardware, software system which is required as a laboratory tool to test aerospace computers. Hardware and software baselines and additions necessary to interface the UTE to aerospace computers for test purposes are outlined. Author

N74-27719*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LOW-COST, AIR MASS 2 SOLAR SIMULATOR
Kenneth Yass and Henry B. Curtis Washington Jun. 1974 26 p refs
(NASA-TM-X-3059; E-7885) Avail: NTIS HC $3.25 CSCL 14B

A low cost air mass 2 solar simulator for testing flat-plate solar collectors was developed and operated at Lewis. Total cost was less than $10,800/sq m ($1000/sq ft). It consists of an array of 143 tungsten-halogen 300-watt lamps, each having integral dichroic coated reflectors. A second array of 143 respective hexagonal-shaped plastic Fresnel lenses are located approximately 1 focal length from the lamps. The simulator will produce a uniform collimated beam covering an area of 1.2 by 1.2m(4 by 4 ft). Design features, construction details, and component costs are given, as well as measured results on a 12-lamp prototype. Author

N74-27720# Weapons Research Establishment, Salisbury (Australia).
THE CALIBRATION AND CHARACTERISTICS OF A SYSTEM OF ASTRODATA DATA AMPLIFIERS
I. C. Heron and R. E. Kane May 1973 37 p refs
(WRE-TN-956(WR/D)) Avail: NTIS HC $5.00

A series of experiments carried out to determine the characteristics of Astrodata 889 data amplifiers used in a wind tunnel data acquisition system is reported. The results of these experiments are used to design software for calibrating the amplifiers; a listing and operational details of the resultant computer program are included. Author

N74-27721# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
A PRELIMINARY STUDY OF THE FEASIBILITY OF AN AIR CUSHION VEHICLE SIMULATOR
D. Band Apr. 1974 65 p refs
(UTIAS-TN-189) Avail: NTIS HC $6.25

The feasibility of a simulator, specifically with reference to hovercraft is studied. The system utilizes a minicomputer and an analog computer. A hovercraft simulation with a straight road lined with simulated telephone poles is explored in detail. Design of a flexible peripheral system is executed, with regard to the specific hovercraft case. Purpose of simulation are reviewed. Real time assembler and FORTRAN programming is outlined and is used to execute the hovercraft simulator system. One specific type of control system is used, but the design is such that rapid interchangeability of control systems is possible. Author

N74-27722*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
THE CRYOGENIC WIND TUNNEL FOR HIGH REYNOLDS NUMBER TESTING Ph.D. Thesis
Robert Ashworth Kilgore Feb. 1974 230 p refs
(NASA-TM-X-70207) Avail: NTIS HC $14.50 CSCL 14B

Experiments performed at the NASA Langley Research Center in a cryogenic low-speed continuous-flow tunnel and in a cryogenic transonic continuous-flow pressure tunnel have demonstrated the predicted changes in Reynolds number, drive power, and fan speed with temperature, while operating with nitrogen as the test gas. The experiments have also demonstrated that cooling to cryogenic temperatures by spraying liquid nitrogen directly into the tunnel circuit is practical and that tunnel temperature can be controlled within very close limits. Whereas most types of wind tunnel could operate with advantage at cryogenic temperatures, the continuous-flow fan-driven tunnel is particularly well suited to take full advantage of operating at these temperatures. A continuous-flow fan-driven cryogenic tunnel to satisfy current requirements for test Reynolds number can be constructed and operated using existing techniques. Both capital and operating costs appear acceptable. Author

N74-27723*# Rensselaer Polytechnic Inst., Troy, N.Y.
SYSTEM DESIGN OPTIMIZATION FOR A MARS-ROVING VEHICLE AND PERTURBED-OPTIMAL SOLUTIONS IN NONLINEAR PROGRAMMING
Carl Pavarini Jun. 1974 176 p refs
(NASA-CR-138817; RPI-TR-MP-43) Avail: NTIS HC $12.00 CSCL 13F

Work in two somewhat distinct areas is presented. First, the optimal system design problem for a Mars-roving vehicle is attacked by creating static system models and a system evaluation function and optimizing via nonlinear programming techniques. The second area concerns the problem of perturbed-optimal solutions. Given an initial perturbation in an element of the solution to a nonlinear programming problem, a linear method is determined to approximate the optimal readjustments of the other elements of the solution. Then, the sensitivity of the Mars rover designs is described by application of this method. Author

N74-27724*# Rensselaer Polytechnic Inst., Troy, N.Y. School of Engineering.
ANALYSIS AND DESIGN OF A CAPSULE LANDING SYSTEM AND SURFACE VEHICLE CONTROL SYSTEM FOR MARS EXPLORATION Progress Report, 1 Jul. - 30 Jun. 1974
30 Jun. 1974 157 p refs
(Grant NGL-33-018-091)
(NASA-CR-138818; RPI-TR-MP-44) Avail: NTIS HC $11.00 CSCL 13F

A number of problems related to the design, construction and evaluation of an autonomous roving planetary vehicle and its control and operating systems intended for an unmanned exploration of Mars are studied. Vehicle configuration, dynamics, control, systems and propulsion; systems analysis; terrain sensing and modeling and path selection; and chemical analysis of samples are included. Author

N74-27725# Jyvaskyla Univ. (Finland). Dept. of Physics.
CARRIER-LOADED HELIUM-JET TRANSPORT METHOD
J. Aeystoe, P. Puumalainen, and K. Valli Jun. 1973 43 p refs
(NP-19890; RR-12/73) avail: AEC Depository Libraries HC $4.25

The suitability of commercial helium loaded with small amounts of different gases or vapors for the transport of radioactive reaction products over distances of several meters was investigated experimentally. Negative results were obtained with gaseous carriers. Transport efficiencies of 50 to 100 per cent were obtained with carrier vapors. The vapor appears to form droplets and carried with them through a capillary. There appears to be an active mechanism that forces the heavy constituents to the centre of the capillary cross section. Heavy constituents emerge from the capillary as a very narrow beam. Collection of the transported activity onto a metal foil in a vacuum chamber is possible only when the vapor pressure of the carrier is lower than the pressure of the collection chamber. Vacuum pump oil was found to meet

this requirement. Transport and collection efficiency was studied as a function of the relative mass throughput of the oil vapor.
Author (NSA)

N74-27726# Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study.
ANNUAL REPORT, APRIL 1972 - MARCH 1973
1973 187 p refs
(NP-19873) Avail: AEC Depository Libraries HC $11.50

Operating data for the cyclotron and electron synchrotron, instrumentation, and research by the low- and high-energy physics divisions are reported. Activities of the cosmic ray and theoretical physics divisions are reviewed. NSA

N74-27727# Transit Development Corp., Washington, D.C.
AERODYNAMIC AND THERMODYNAMIC VALIDATION TESTS IN BERKELEY HILLS TUNNEL, VOLUME 1 Final Report
Jun. 1973 123 p Sponsored by DOT
(PB-226898/5; UMTA-DC-06-0010-73-3-Vol-1) Avail: NTIS HC $4.50 CSCL 13F

A milestone report has been prepared on the project Ventilation and Environmental Control in subway Rapid Transit Systems, one of many such reports leading to the final product -- a 'Subway Environment Design Handbook.' The report describes a series of field tests conducted on the Bay Area Rapid Transit (BART) system in California for the purpose of validating analytical tools developed for the project. The document is the first volume in a two volume set. GRA

N74-27728# Manned Systems Sciences, Inc., Northridge, Calif.
TRAINING EFFECTIVENESS EVALUATION: DEVICE 1D23 COMMUNICATION AND NAVIGATION TRAINER Final Report
Clarence A. Semple, Jr. Mar. 1974 101 p refs
(Contract N61339-72-C-0209)
(AD-776619; NAVTRAEQUIPC-72-C-0209-2) Avail: NTIS CSCL 05/9

A study was performed to evaluate the training effectiveness of Communication and Navigation Training Device 1D23. Four objectives were addressed: Assess impacts of training in the device upon student dead reckoning navigation performance; determine impacts of training in the device upon communication and navigation performance in point-to-point and airways navigation; determine impacts of increased amounts of training in the device upon communication and navigation performance in dead reckoning point-to-point, and airways navigation; and develop design oriented information for application to further training device designs. Flight grades and supplemental measures of student performance were analyzed. No performance improvements were found as a result of the additional training which was examined. (Modified author abstract) GRA

N74-27729# Naval Air Test Facility, Lakehurst, N.J.
EVALUATION REPORT FOR INTEGRATED CATAPULT CONTROL STATION COMPARTMENT ELEVATING MECHANISM SUBSYSTEM OF THE CVAN 68 CATAPULT SYSTEM Final Report, 18 Feb. 1973 - 4 Jan. 1974
Wayne Brocklebank 3 Apr. 1974 18 p
(AD-777402; NATF-EN-1131) Avail: NTIS CSCL 13/10

The report presents the final results of evaluation testing of the Integrated Catapult Control Station compartment/elevating mechanism subsystem. The general operation of the compartment/elevating mechanism subsystem was satisfactory.
Author (GRA)

N74-28004* Scientific Translation Service, Santa Barbara, Calif.
STAND FOR STUDYING TECHNOLOGICAL PROCESSES UNDER CONDITIONS SIMULATING SPACE
B. Ye. Paton, V. Ye. Paton, D. A. Dudko, V. N. Bernadskiy, G. P. Dubenko, V. F. Lapchinskiy, V. V. Stesin, A. A. Zagrebelnyy, Yu. N. Lankin, Yu. A. Masalov et al. *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 1-8 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 5-9 (For availability see N74-28003 17-18)
CSCL 14B

N74-28031 Minnkota Power Cooperative, Inc., Grand Forks, N. Dak.
LIGNITE AND THE CYCLONE BURNER IN A NEW 235-mw GENERATING STATION
Lloyd Hillier and B. W. Rudiger (Sanderson and Porter, New York) *In* Bur. of Mines Technol. and Use of Lignite 1972 p 112-126 (For availability see N74-28020 17-18)

N74-28032 Minnkota Power Cooperative, Inc., Grand Forks, N. Dak.
DETAILED CONSTRUCTION AND EQUIPMENT COSTS FOR THE 235- mW MILTON R. YOUNG GENERATING STATION
Kenneth S. Vig *In* Bur. of Mines Technol. and Use of Lignite 1972 p 127-145 (For availability see N74-28020 17-18)

N74-28120* Kanner (Leo) Associates, Redwood City, Calif.
ANECHOIC CHAMBER IN INDUSTRIAL PLANTS
E. Halpert, O. Juncu, R. Lorian, D. Marfievici, and I. Mararu *In its* The 4th Natl. Conf. on Acoustic, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 29-31 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 375-379 (For availability see N74-28115 17-23)
CSCL 14B

N74-28396* Kanner (Leo) Associates, Redwood City, Calif.
CONCERNS OF THE INSTITUTE OF TRANSPORT STUDY AND RESEARCH FOR REDUCING THE SOUND LEVEL INSIDE COMPLETELY REPAIRED BUSES
Alex. Groza, Jh. Calciu, I. Nicola, and Angela Ionasek *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 205-211 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A: Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 269-274 (For availability see N74-28363 17-32)
CSCL 13F

12 FLUID MECHANICS

Includes boundary-layer flow; compressible flow; gas dynamics; hydrodynamics; and turbulence. For related information see also: 01 Aerodynamics; and 33 Thermodynamics and Combustion.

N74-27730* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
APPARATUS FOR ESTABLISHING FLOW OF A FLUID MASS HAVING A KNOWN VELOCITY Patent
Peter Price (Inca Eng. Corp.), Olgerts Veikins (Inca Eng. Inc.), Edward R. Bate, Jr. (Inca Eng. Corp.), and Robert H. Jones, inventors (to NASA) Issued 18 Jun. 1974 8 p Filed 14 Dec. 1972 Supersedes N73-16248 (11 - 07, p 0769) Sponsored by NASA
(NASA-Case-MFS-21424-1; US-Patent-3,817,082;
US-Patent-Appl-SN-315048; US-Patent-Class-73-3;
US-Patent-Class-73-147) Avail: US Patent Office CSCL 20D

An apparatus for establishing a flow of fluid mass, such as gas, having a known velocity is introduced. The apparatus is characterized by an hermetically sealed chamber conforming to a closed-loop configuration and including a throat and a plurality of axially displaceable pistons for sweeping through the throat a stream of gas including a core and an unsheared boundary layer. Within the throat there is a cylindrical coring body concentrically related to the throat for receiving the core, and a chamber surrounding the cylindrical body for drawing off the boundary layer, whereby the velocity of the core is liberated from the effects of the velocity of the boundary layer.
Official Gazette of the U.S. Patent Office

N74-27731 Minnesota Univ., Minneapolis.
FLOW OF GASES THROUGH AND OVER POROUS MATERIALS Ph.D. Thesis
Babatunde Alli Masha 1973 276 p
Avail: Univ. Microfilms Order No. 74-10543

The effect of fluid type on the flow characterizing constants, particularly the permeability of a porous material, was investigated experimentally. The porous materials were specially selected so that some known causes of apparent differences in permeability of a porous material to liquids and gases were eliminated. It was also possible to study flows in both the Darcy and non-Darcy regimes. Experiments were performed to establish the validity of the slip flow boundary condition for gas flow over porous boundaries, when there is a Darcy flow in the porous material. Corresponding analysis was also undertaken. The experimental results indicated that differences in permeability of a porous material to liquid flows and gas flows were real, and that present rationalizations of such permeability differences would not be applicable in this situation. Dissert. Abstr.

N74-27732 Case Western Reserve Univ., Cleveland, Ohio.
EXPERIMENTAL STUDY OF THE STABILITY OF A LAMINAR BOUNDARY LAYER IN WATER Ph.D. Thesis
Minor L. Nice 1973 231 p
Avail: Univ. Microfilms Order No. 74-10811

The adaptation of an existing low turbulence water tunnel facility for stability measurements in a laminar boundary layer developing along a flat plate with a rounded leading edge is described. In addition, experimental techniques are developed for the use of hot-film anemometry in detecting stability characteristics in a laminary boundary layer in water and except for the compensation of sensors for temperature differences, these techniques are applicable to the case of either heated or unheated boundary layers. Spectrum measurements are presented for two hot-film sensors (wedge and cylindrical) and they show geometry of the sensor has a significant effect upon the a.c. signals from hot-film sensors. Measurements are presented on the response of an unheated, laminar boundary layer in water to linear sinusoidal velocity disturbances. Dissert. Abstr.

N74-27733 Wisconsin Univ., Madison.
AN EXPERIMENTAL STUDY OF CARBON DIOXIDE DROPLETS FALLING THROUGH INERT HIGH PRESSURE HIGH TEMPERATURE ENVIRONMENTS Ph.D. Thesis
Richard Eugene Sowls 1973 235 p
Avail: Univ. Microfilms Order No. 74-9022

Visual observations from films of carbon dioxide droplets falling through argon, nitrogen, and helium, as well as vaporization rates and temperatures determined from the size and period of oscillation of carbon dioxide droplets falling through helium, are reported. Ambient gas conditions from 30.4 to 154.8 atm. and 304.2 to 1065 K were used. Film theory calculations using property values appropriate for the actual pressures were compared with the experimental values. Droplet temperatures obtained from film theory and from periods of oscillation are systematically different at low temperatures but agree well at high temperatures. Film theory vaporization rates agree well with experimental values for ambient conditions giving low film theory temperatures, but become progressively larger than experimental values as ambient conditions give higher film theory temperatures. Dissert. Abstr.

N74-27734 Stanford Univ., Calif.
A METHOD FOR CALCULATION OF A FULLY STALLED FLOW Ph.D. Thesis
Ronald Lee Woolley 1974 217 p
Avail: Univ. Microfilms Order No. 74-13708

An interacting zone method of calculation is developed for predicting stalled turbulent flows which are nominally two dimensional, incompressible, and steady. The total problem is divided into zones selected such that each can be represented by a manageable analytical model. When applied to the case of the fully stalled diffuser, adequate a priori predictions are achieved with careful handling. Predictions show a strong sensitivity to location of separation as does the actual diffuser. Dissert. Abstr.

N74-27735 Princeton Univ., N.J.
INTERACTION OF REACTING AND NONREACTING AXISYMMETRIC FLOWS WITH A COAXIAL OSCILLATING STREAM IN THE NEAR REGION Ph.D. Thesis
Ashok Kumar Varma 1973 383 p
Avail: Univ. Microfilms Order No. 74-9725

The effect of axial velocity oscillations imposed at the boundaries of both axisymmetric cold flows and diffusion flame flow fields are studied. A linearized theoretical analysis of the near region of the flow field is presented and a comparison of the experimental measurements to the numerical theoretical solution is shown. The non-reacting flow velocity measurements are made with the aid of hot wire probes. Temperature measurements in the flames are made with coated fine-wire thermocouples. It is shown that the imposed oscillations interact significantly with the flow field, resulting in amplification of the oscillations and large phase changes. The interaction depends strongly on the frequency and axial position, and reaches a maximum when the wave travel time is of the same order as the diffusion time across the sheer layer. The product of the frequency and the axial position for maximum interaction is shown to be a constant. Dissert. Abstr.

N74-27736 University of Southern Calif., Los Angeles.
ON THE SPIN-UP AND SPIN-DOWN OF A CONTAINED FLUID Ph.D. Thesis
Patrick Dan Weidman 1973 225 p
Avail: Univ. Microfilms Order No. 74-11718

An analytical and experimental investigation is made of the fluid motion inside a uniformly accelerating (or decelerating) cylinder. It is mathematically demonstrated that an exact fit to numerical computations for the Ekman mass flux will result in a velocity discontinuity at the wave front in the inviscid equation for impulsive spin-up from rest. Laser Doppler measurements of the azimuthal velocity near the wave front indicate that the propagating discontinuity is smoothed out in an E to the one quarter power shear layer, and away from the wave front the theoretical and experimental results are in accord. In the case of spin-down, the measured velocity profiles are in excellent agreement with theory when the flow is stable. Flow visualization studies have made possible the determination of stability boundaries for both the spiral Ekman waves observed at the cylinder end walls during spin-up, and the Gortler vortices which appeared along the cylindrical wall during spin-down.
Dissert. Abstr.

N74-27737 Tennessee Univ., Knoxville.
SOME PHENOMENOLOGICAL ASPECTS OF RAREFIED INTERNAL FLOW Ph.D. Thesis
Kerry Edwards Patterson 1973 153 p
Avail: Univ. Microfilms Order No. 74-11283

Some non-continuum effects in rarefied internal flow are investigated to determine the relationship between these effects and the formulation of the stress tensor and the heat flux vector. The linearized Boltzmann equation for the infinite parallel plate problem is used to generate a set of moment equations which is a linearized form of the Grad thirteen moment equations. This system of moment equations is solved in order to obtain a solution for the volume flow rate. The non-continuum effects in the flow rate solution are easily traced back through the solution to their source. The free molecular behavior of the solution is found to be determined by a non-zero axial heat flux which is proportional to the pressure gradient and which exists even though the flow is isothermal. This heat flux is shown to be predicted by the linearized Boltzmann equation and to similarly related to the flow rate predicted by this equation.
Dissert. Abstr.

N74-27738 Ohio State Univ., Columbus.
THE NUMERICAL SOLUTION OF THE ASYMPTOTIC EQUATIONS OF TRAILING EDGE FLOW Ph.D. Thesis
Charles Edwin Jobe 1973 122 p
Avail: Univ. Microfilms Order No. 74-10978

Equations were solved numerically using a Cauchy-integral algorithm for the outer layer and a modified Crank-Nicholson boundary layer program for the inter layer. An iterative procedure was used to account for the pressure displacement function interaction between the layers. Results of the computation compare well with experimental and other computed results.
Dissert. Abstr.

N74-27739 Ohio State Univ., Columbus.
DRAG REDUCTION VISUAL STUDY Ph.D. Thesis
Charles Nelson Carpenter 1973 225 p
Avail: Univ. Microfilms Order No. 74-10926

A particle tracer technique was used observing instantaneous

phenomena to conclude mechanisms and qualitative levels of turbulent energy dissipation. Aluminum dioctoate, a soap; Polyox coagulant, a polymer, and pure fluid were compared in experimental runs. A high speed movie camera was used to photograph tracer particles suspended in trichloroethylene flowing through a glass pipe illuminated with a mercury lamp. Both the fluid and the glass pipe had the same index of refraction. The glass pipe was immersed in trichloroethylene to eliminate refractive index effects from the glass-air interface. Onset of drag reduction in a 2.54 centimeter inside diameter pipe for 0.1 weight percent aluminum dioctoate or 250 weight ppm Polyox coagulant occurred near or above a Reynolds number of 20,000 with no apparent minimum up through a Reynolds number of 230,000.
Dissert. Abstr.

N74-27740 West Virginia Univ., Morgantown.
INJECTION OF A SOLID-GAS JET INTO A UNIFORM TRANSVERSE STREAM Ph.D. Thesis
Ronald Norman Salzman 1973 221 p
Avail: Univ. Microfilms Order No. 74-11401

The results of an experimental study of the trajectory and dispersion of a solid-gas jet injected into a uniform transverse stream are presented. The experiment consisted of injecting a solid-gas (silicate-air) jet into a transverse stream and asperating isokinetic samples at selected locations downstream of the injection. Concentration profiles of the particulate phase at these downstream locations were used to define the centerline and the spread of the jet. These data were reduced using regression analysis techniques and empirical relations were obtained.
Dissert. Abstr.

N74-27741 Minnesota Univ., Minneapolis.
MEASUREMENTS OF HELIUM 2 FLOW THROUGH SMALL PORES Ph.D. Thesis
Brian Bernard Sabo 1973 112 p
Avail: Univ. Microfilms Order No. 74-10576

The measurement of variations of the average superfluid density of liquid helium in small pores of well defined geometry was conducted. The characteristics and performance of the test equipment are reported. The arrangement of the apparatus produced Helmholtz oscillations of the liquid mercury. The resonant frequency provides a measure of the effective superfluid density in the pores of the superleak. A search was made for a suppression of the superfluid density in the pores near the lambda point and a lowering of the superfluid onset temperature. For each superleak it was observed that an extrinsic regime of temperature dependent critical velocities exists. Through use of a pressure detection system it was possible to observe an unexpected and rapid energy dissipation in a single orifice. Dissert. Abstr.

N74-27742 Minnesota Univ., Minneapolis.
AN EXPERIMENTAL STUDY OF TWO-DIMENSIONAL AND THREE-DIMENSIONAL CURVED WALL JETS Ph.D. Thesis
Rodney Brewer Rask 1973 271 p
Avail: Univ. Microfilms Order No. 74-10569

The Coanda effect in a curved wall jet is investigated for both two-dimensional and three-dimensional wall jets. Flow visualization results give the qualitative nature of the flows, and mass concentration measurements made with a foreign gas tracer in the jet flow give quantitative results. Some hotfilm anemometer measurements are also included. Wall concentration measurements for the two-dimensional jet show four regions: potential core, mixing region, separation region, and backflow region. Wall effectiveness values agree well with previous temperature measurements. Wall concentrations were measured for the three-dimensional jets. The flow is divided into four basic regions: potential core, mixing region, separation region, and intermittent region. Wall effectiveness is a function of aspect ratio and jet thickness. Separation angle is a strong function of aspect ratio and a weak function of slot Reynolds number for the present range of parameters. The wall effectiveness is slightly higher off the jet centerline than on the centerline. Dissert. Abstr.

N74-27743 Illinois Univ., Urbana.
ANALYSIS OF VISCOUS FLOW PAST WEDGES AT LOW AND MODERATE REYNOLDS NUMBERS Ph.D. Thesis
Stanislaus Nosakhare Evbuoma 1973 132 p
Avail: Univ. Microfilms Order No. 74-5560

The viscous flow past wedges at moderate and low Reynolds numbers is studied theoretically. The study is carried out with two approaches. It is well known that the classical boundary layer solution for wedges is valid at very large Reynolds numbers. Using the method of matched asymptotic expansions in optimal coordinates, higher order boundary layer approximations are found which yield better accuracy at moderate values of Reynolds number. Regardless of the number of higher order terms calculated, the resulting asymptotic series diverges for Reynolds numbers less than unity. A second apprach involves the numerical solution of the full Navier-Stokes equations for a region including the leading, edge. The equations of motion are reduced to the vorticity transport form in optimal coordinates and then these are solved by finite difference method. Dissert. Abstr.

N74-27744* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
APPARATUS FOR CONDUCTING FLOW ELECTROPHORESIS IN THE SUBSTANTIAL ABSENCE OF GRAVITY Patent
Richard N. Griffin (GE, Philadelphia) and Louis R. McCreight, inventors (to NASA) (GE, Philadelphia) Issued 28 Jun. 1974 5 p Filed 31 May 1972 Supersedes N72-27310 (10 - 18, p 2412 Sponsored by NASA
(NASA-Case-MFS-21394-1; US-Patent-3,821,102; US-Patent-Appl-SN-258171; US-Patent-Class-204-299; US-Patent-Class-204-180R) Avail: US Patent Office CSCL 20D

A zero-g, constant flow electrophoretic separating apparatus is presented. The apparatus is composed a deflecting member to spread carrier fluid across a conduit, and an end wall with a valve located in the conduit past the separation electrodes from which layers of carrier and sample may be extracted. Electrode electrolyte is separated from the carrier and continually circulated and cleaned. Official Gazette of the U.S. Patent Office

N74-27745*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
AN EXPERIMENTAL STUDY OF JET EXHAUST SIMULATION
William B. Compton, III Jun. 1974 102 p refs
(NASA-TM-X-71975) Avail: NTIS HC $4.50 CSCL 01A

An investigation was conducted to determine the effect of varying the jet exhaust ratio of specific heats, gas constants, and temperatures on jet interference on afterbody drag. Jet exhaust simulation parameters were also evaluated. In addition to air, three other exhaust gases, each with a different value of each of the gas parameters, were tested. The range of the ratios of specific heats, gas constants, and total temperatures of the four gases are identified. Tests were made using a single nacelle model with afterbodies having boattail angles of 10 degrees and 20 degrees with sonic and Mach two jet exits. Wind tunnel tests were conducted through a Mach number range of 0.60 to 1.20 and a Reynolds number per meter from 10.06 million to 14.05 million. Author

N74-27746*# Martin Marietta Labs., Baltimore, Md.
DEVELOPMENT OF A METHOD OF ANALYSIS AND COMPUTER PROGRAM FOR CALCULATING THE INVISCID FLOW ABOUT THE WINDWARD SURFACES OF SPACE SHUTTLE CONFIGURATIONS AT LARGE ANGLES OF ATTACK Final Report
Stephen H. Maslen Jan. 1974 26 p refs
(Contract NAS1-11604)
(NASA-CR-132453; MML-TR-74-5C) Avail: NTIS HC $3.25 CSCL 01A

A general method developed for the analysis of inviscid hypersonic shock layers is discussed for application to the case of the shuttle vehicle at high (65 deg) angle of attack. The associated extensive subsonic flow region caused convergence difficulties whose resolution is discussed. It is required that the solution be smoother than anticipated. Author

N74-27747# Royal Aircraft Establishment, Farnborough (England).
THE PROBLEM OF THE WEDGE IN ACOUSTICS
P. Ambaud and A. Bergassoli Nov. 1973 20 p refs Transl. into ENGLISH from Acoustica (West Germany), v. 27, no. 5,

1972 p 291-298
(RAE-Lib-Trans-1726; BR38412) Avail: NTIS HC $4.00

The theoretical solution to the problem of the diffraction of a scalar spherical wave by an infinite reflecting wedge is restated and evaluated using a UNIVAC 1108 computer. Numerical results are in good agreement with those obtained by careful experiment. Observed deviations are of the order of magnitude of the uncertainty in the acoustical measurements. Author

N74-27748# Royal Aircraft Establishment, Farnborough (England).
RETARDATION OF FRAGMENTS IN AIR
Bo Janzon Jan. 1973 76 p refs Transl. into ENGLISH from the Swedish report FOA-2-A-2539-44
(RAE-Lib-Trans-1681; BR33203; FOA-2-A-2539-44) Avail: NTIS HC $7.00

A search of the literature and a collation of the available domestic and foreign information concerning the air resistance chiefly to different forms of explosively projected fragments are reported. Some simple recommendations suitable for the calculation of data and for assessments connected with munitions effectiveness are included. The method of determining experimentally air resistance to fragments is summarized, and in conclusion some simple worked examples are reported. Nomograms are given for the rapid estimation of air resistance. Author

N74-27749*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
VISCOUS, RADIATING HYPERSONIC FLOW ABOUT A BLUNT BODY
Richard S. Passamaneck 1 May 1974 72 p refs
(Contract NAS7-100)
(NASA-CR-138767; JPL-TM-33-687) Avail: NTIS HC $6.75 CSCL 20D

The viscous, radiating hypersonic flow past an axisymmetric blunt body is analyzed based on the Navier-Stokes equations, plus a radiative equation of transfer derived from the Milne-Eddington differential approximation. The fluid is assumed to be a perfect gas with constant specific heats, a constant Prandtl number of order unity, a viscosity coefficient varying as a power of the temperature, and an absorption coefficient varying as the first power of the density and as a power of the temperature. The gray gas assumption is invoked, thereby making the absorption coefficient independent of the spectral frequency. Limiting forms of the solutions are studied as the freestream Mach number freestream Reynolds number and the temperature ratio across the shock wave, go to infinity, and as the Bouguer number and the density ratio across the shock wave go to zero. The method of matched asymptotic expansions is used in the analysis, and it is shown that there is a far-field precursor, composed of two regions, in which the fluid mechanics can be neglected for all practical purposes but included for completeness. Author

N74-27750*# National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.
SIMILITUDE REQUIREMENTS FOR HYPERSONIC, RAREFIED, NONEQUILIBRIUM FLOW
William L. Hendricks Jul. 1974 14 p refs
(NASA-TM-X-64859) Avail: NTIS HC $3.00 CSCL 20D

Similitude requirements for hypersonic, rarefied flow with nonequilibrium chemistry and vibration are presented. The full Navier-Stokes equations with catalytic or noncatalytic walls and with or without slip conditions are nondimensionalized. The heat transfer coefficient is written in terms of fourteen dimensionless parameters and reduced to four by making the binary scaling assumption. Duplication of blunt and sharp nose heat transfer requires the use of air over a geometrically similar model with the same free stream velocity, wall temperature and product of free stream density and characteristic length. Estimates of this heat transfer coefficient are also presented. Author

N74-27751*# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.
NUMERICAL SOLUTION OF THE STEADY-STATE NAVIER-STOKES EQUATIONS FOR HYPERSONIC FLOW ABOUT BLUNT AXISYMMETRIC BODIES
E. C. Anderson and James N. Moss Jun. 1974 6 p refs Presented at the 10th Anniv. Meeting of the Soc. of Eng. Sci., 1973 Submitted for publication
(NASA-TM-X-71977) Avail: NTIS HC $3.00 CSCL 20D

The steady-state Navier-Stokes equations are solved for hypersonic flow about blunt axisymmetric bodies. The equations of motion are solved by successive approximations using an implicit finite-difference scheme. The results are compared with viscous shock-layer theory, experimental data, and time-dependent solutions of the Navier-Stokes equations. It is demonstrated that viscous shock-layer theory is sufficiently accurate for the range of flight conditions normally encountered by entry vehicles. Author

N74-27752# Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
NUMERICAL COMPUTATION OF PRACTICAL COMBUSTION-CHAMBER FLOWS
D. B. Spalding Mar. 1974 45 p refs Presented at the AGARD Propulsion and Energetics Panel, Liege, 1-2 Apr. 1974
(HTS/74/10) Avail: NTIS HC $5.25

Numerical procedures for predicting combustion-chamber flows rest on two foundations: mathematical models of physical processes, and computer programs for solving the resulting differential equations. Models for turbulence, radiation, chemical kinetics and two-phase effects, are reviewed. Fields of applicability of the computer programs PASS, EASI, STABL, and TRIC, all of which employ the SIMPLE algorithm, are described. The ways in which the computer programs and the mathematical models can be used for practical purposes are illustrated by reference to: steady flame spread in a duct, the inclined rocket exhaust, the annular-combustor sector, and the reaction region of a chemical laser. Author

N74-27753# Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
MEASUREMENT OF MEAN AND FLUCTUATING TEMPERATURE AND OF ION CONCENTRATION IN ROUND FREE JET TURBULENT DIFFUSION AND PREMIXED FLAMES
F. C. Lockwood and A. O. Odini Apr. 1974 26 p refs
(HTS/74/17) Avail: NTIS HC $4.50

Measurements are reported of mean, rms, probability density and spectral density of temperature and of positive ion concentration in unpremixed and premixed, turbulent, round, free jet flames. Physical pictures emerge which enhance the understanding of turbulent combustion and facilitate the prescription of appropriate mathematical models. Quantitative information about the intermittent nature of turbulent unpremixed combustion is provided by the data. Furthermore, the measurements suggest that premixed reaction in fully turbulent flows is governed by transport between Kolmogorov micro-scale vortex tubes in different states of reactedness. Author

N74-27754# Michigan Univ., Ann Arbor. Cavitation and Multiphase Flow Lab.
CAVITATION INCEPTION IN VENTURI IN SODIUM AND WATER Internal Report
F. G. Hammitt Nov. 1973 10 p refs
(Grant NSF GK-1889)
(PB-226831/6; UMICH-01357-21-1) Avail: NTIS HC $4.00 CSCL 20D

The report presents the only direct comparison known to the author concerning a venturi-type device, i.e., orifices, valves, or other flow restrictions. In this particular case, cavitation tests have been made using a particular venturi design at both the Chatou laboratory of Electricite de France, and at the Cavitation and Multiphase Flow Laboratory of the University of Michigan. A single stainless steel venturi was tested in both sodium and water at EdF. A venturi of identical flow path design had previously been tested in water at the University of Michigan. GRA

N74-27755# Michigan Univ., Ann Arbor. Cavitation and Multiphase Flow Lab.
GAS NUCLEI SPECTRA AND CAVITATION IN VENTURI Technical Report
O. S. M. Ahmed, F. G. Hammitt, and A. Keller Dec. 1973 40 p refs
(Grant NSF GK-1889)
(PB-226830/8; UMICH-01357-33-T) Avail: NTIS HC $5.00 CSCL 20D

The measurement of cavitation nuclei spectra in a water

tunnel using a modified Coulter-Counter system is reported. Measurements were made in a closed high-speed water tunnel at different pressures and velocities, under both cavitating and non-cavitating conditions. The measurements included the effect of the cavitation nuclei pressurization history upon nuclei spectra and cavitation sigma. A very strong diminution of cavitation nuclei population in the tunnel with operating time and with pressure is shown. It is also shown that the entrained gas necessary for normal cavitation behavior is a very small portion of the total gas content. An empirical relation to fit the experimental data was developed, and found applicable to all conditions, verifying its perhaps fairly general applicability. The correlation of inception and desinence cavitation sigma with nuclei spectra prove the interelation between these parameters. Author (GRA)

N74-27756# Stevens Inst. of Tech., Hoboken, N.J. Davidson Lab.
SEAKEEPING CHARACTERISTICS OF FOUR MEMBERS OF HYDROFOIL HULL SERIES 65 Final Report
R. L. VanDyck Apr. 1973 58 p
(Contract N00014-67-A-0202-0013)
(AD-777733; SIT-DL-72-1563) Avail: NTIS CSCL 13/10

A systematic study of the effects of hull-hydrofoil arrangement, hull length-beam ratio, sea state, loading, speed, longitudinal center of gravity location and simulated hydrofoil damping was made on the rough-water performance of a series of hull forms suitable for hydrofoil craft operation. Measurements of resistance, heave and pitch motions, and impact accelerations at two locations serve as a basis for comparison. From the particular range of parameters investigated it appears that: hulls appropriate to an airplane hydrofoil arrangement have better seakeeping characteristics than those intended for a canard layout; added resistance is shown to be a linear function of load, sea-state and speed; impact loads increase with length-beam and the square of the speed and decrease with hull loading; motions are reduced at high length-beam ratio and are insensitive to load; the response of hydrofoil hulls is confirmed to be non-linear. Author (GRA)

N74-27757# Douglas Aircraft Co., Inc., Long Beach, Calif.
TRANSITION PREDICTION ON BODIES OF REVOLUTION
K. Kaups Apr. 1974 73 p refs
(Contract N66001-74-C-0020)
(AD-778045; MDC-J6530) Avail: NTIS CSCL 20/4

The purpose of the study was to evaluate transition prediction methods for axisymmetric configurations at high Reynolds numbers in incompressible flow. Methods selected for comparison were those Michel, Smith and Gamberoni, Hall and Gibbings, and Granville. Evaluation against the limited amount of experimental data available at relatively low Reynolds numbers indicates that no single method gives consistently satisfactory answers. The method of Smith and Gamberoni is given some discussion. All four methods were also applied to the calculation of transition points on four specified configurations and to a series of four semi-infinite bodies with elliptic nose caps. (Modified author abstract) GRA

N74-27758# Naval Ordnance Lab., White Oak, Md.
INTERACTIONS BETWEEN A MULTICOMPONENT FLOW AND A LASER BEAM. PART 1: VAPORIZATION OF LIQUID-AIR DROPLETS BY HIGH-POWER LASER BEAMS Interim Report, 1 Feb. - 30 Jul. 1973
Kuei-Yuan Chien Mar. 1974 13 p refs
(AF Proj. 7065)
(AD-778079; NOLTR-74-49; ARL-74-0050) Avail: NTIS CSCL 20/4

The interaction between a high-power laser beam and a moving cloud of vaporizing droplets is considered theoretically. A study was performed to assess partially the feasibility of a new concept of generating an ultra-high-total-enthalpy flow. The spectral absorption coefficient of liquid air was determined at the fundamental vibration-rotation frequencies of liquid nitrogen and oxygen. A perturbation solution was sought for a small arbitrary variation in the velocity of the moving droplets. The first-order correction to uniform-velocity solution has been explicitly carried out in closed form. (Modified author abstract) GRA

N74-27759# Stevens Inst. of Tech., Hoboken, N.J. Davidson Lab.
LIFTING SURFACE THEORY AND HYDROELASTIC INSTABILITY Final Report
S. Tsakonas, W. R. Jacobs, and M. R. Ali Sep. 1973 81 p refs
(Contract N00014-67-A-0202-0032)
(AD-778351; SIT-DL-73-1653) Avail: NTIS CSCL 13/10

A brief review is presented of the unsteady lifting surface theory and of the generalized lift operator technique of inverting the downwash integral equation. The integral equation approach is then employed to predict responses of various foils to pitching oscillations and to forward motion in a regular wave train. The agreement between theoretical predictions and experimental results is good for simple configurations without appendages, but not in the case of the AG(EH) configuration at low frequencies because the presence of the pod is not taken into account in the theoretical calculations. Although the attempt made to remove the spurious leading-edge singularity in the chordwise pressure distribution before inverting the integral equation is questionable, removal of the singularity after the inversion yields responses consistent with other theoretical and experimental trends. (Modified author abstract) GRA

N74-27760# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
TURBULENT DRAG REDUCTION BY POLYACRYLIC ACID Journal Prepublication, 1 Jun. 1973 - 1 Mar. 1974
S. H. Banijamali, E. W. Merrill, K. A. Smith, and L. H. Peebles, Jr. 8 Apr. 1974 17 p refs Submitted for publication
(Contract N00014-67-A-0204-0037)
(AD-778040; CED-DR-74-1) Avail: NTIS CSCL 20/4

Polyacrylic acid was synthesized to high molecular weight, then studied as a drag reducing agent in dilute solutions of variable pH and ionic strength, the polymer being in both non-ionized and polysalt forms. As the polymer varies from the non-ionized polycarboxylic acid in the form of a compact coil at pH 2 to the polycarboxylate salt in the form of a very highly extended coil in solutions of low ionic strength, its effectiveness in drag reduction continuously increases. (Modified author abstract) GRA

N74-27761# Naval Ordnance Lab., White Oak, Md.
MEASUREMENTS OF SUPERSONIC FAVORABLE PRESSURE GRADIENT TURBULENT BOUNDARY LAYER WITH HEAT TRANSFER. PART 1: DATA COMPILATION
Robert L. P. Voisinet and Roland E. Lee 12 Dec. 1973 106 p refs
(AD-778306; NOLTR-73-224-Pt-1) Avail: NTIS CSCL 20/4

The results of a detailed experimental investigation of the compressible turbulent boundary layer in a favorable-pressure-gradient flow are presented for zero, moderate and severe heat-transfer conditions. The studies were conducted on a flat nozzle wall at momentum thickness Reynolds numbers from 6,700 to 56,000 and at three wall-to-adiabatic-wall temperature ratios. An attempt was made to hold values of Clauser's pressure-gradient parameter constant. Complete profile measurements were taken with Pitot pressure probes and conical-equilibrium and fine-wire temperature probes. (Modified author abstract) GRA

N74-27762# Michigan Univ., Ann Arbor. Cavitation and Multiphase Flow Lab.
A NEW TECHNIQUE FOR THE MEASUREMENT OF CAVITATION NUCLEI SPECTRA
Osman S. M. Ahmed Oct. 1973 188 p refs
(Grant NSF GK-1889)
(PB-228020/4; UMICH-013570-32-T) Avail: NTIS HC $12.50 CSCL 20D

A new technique was developed using a modified electronic coulter counter which was orginally developed for the measurement of particle sizes in other fields of science and engineering. The device was used to measure the cavitation nuclei size distribution in a closed high-speed water tunnel at different pressures and velocities, under both cavitating and non-cavitating conditions. The work also included the study of the cavitation nuclei pressurization history under short term pressurization periods as well as long term pressurization periods. The results obtained showed the diminution of cavitation nuclei population

with time and pressure as a result of the entrained gas becoming dissolved. Also, part of the total gas content which is entrained and is responsible for maintaining cavitation, is a very small portion of the total gas content. (Modified author abstract) GRA

N74-28386* Kanner (Leo) Associates, Redwood City, Calif.
THE COANDA EFFECT IN GAS-DYNAMIC NOISE CONTROL
Grigore Vasilescu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 143-149 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 189-197 (For availability see N74-28363 17-32)
CSCL 20D

13 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; oceanography; cartography; and geodesy. For related information see also: 20 Meteorology; 29 Space Radiation; and 30 Space Sciences.

N74-27763 Georgia Inst. of Tech., Atlanta.
A SCALAR-TENSOR THEORY OF GRAVITATION COMPATIBLE WITH MACH'S PRINCIPLE Ph.D. Thesis
David Hale Wycherley 1974 110 p
Avail: Univ. Microfilms Order No. 74-11422

An analysis was made to a Mach's principle compatable scalar tensor theory of gravitation. Detailed information is given on the theory and it was shown that either of two fundamentally different forms, the strong and the weak, can be adopted for the theory. It was also shown that general relativity, while compatible with the weak form, cannot be made compatible with the strong form. In order to obtain a theory which is compatible with the strong form, a particular set of scalar tensor field equations must be found. Dissert. Abstr.

N74-27764 Stanford Univ., Calif.
STUDIES OF LARGE IMPACT CRATERS Ph.D. Thesis
Brian Edward Dent 1974 122 p
Avail: Univ. Microfilms Order No. 74-13622

Three large-impact-crater problem areas are investigated. A three-dimensional model is developed for the 10-km-diameter, buried impact crater which forms Deep Bay, Saskatchewan, based on its negative gravity anomaly. The major problem of removing the complex regional variations in gravity is accomplished by assuming correlations between observed lithology and gravity changes. The smoothed residual gravity and the anomaly of the final model are very similar. The model includes a central uplift displaced from the exact center of the crater, and which may have determined the form of the glacially-eroded floor of the bay. The crater-filling sediments, fall-back breccia, and central uplift are sufficient to explain only two-thirds of the observed anomaly, the rest appears due to a broad zone of fracture-induced density lowering. Dissert. Abstr.

N74-27765 Wisconsin Univ., Madison.
THE STRUCTURE OF THE KEWEENAW CURRENT BY PHOTOGRAMMETRY Ph.D. Thesis
Lanny Alan Yeske 1973 416 p
Avail: Univ. Microfilms Order No. 74-9030

Measurements of the surface velocity structure off the Keweenaw Peninsula of Lake Superior were obtained in 1971 and 1972, using aerial photography to track surface drift cards. Automatic data reduction techniques, employing standard photogrammetric procedures, were developed to process nearly 10,000 velocities. To facilitate data interpretation, interpolation through objective analysis was used to convert from Lagrangian to Eulerian information. Comparisons with direct observations indicate that synoptic current information can be obtained across an entire coastal region at intervals of several minutes and to accuracies within 2 cm/sec in speed and 3 deg in direction. Dissert. Abstr.

N74-27766 Kansas Univ., Lawrence.
SMALL SCALE LAND USE MAPPING WITH RADAR IMAGERY Ph.D. Thesis
Floyd Merl Henderson 1973 176 p
Avail: Univ. Microfilms Order No. 74-12571

The purpose of this study was to investigate the utility of side-looking airborne radar (SLAR) for general land use mapping at small scale (1:250,000 and smaller) and to obtain an idea of the consistency with which certaintype of borders and regions could be delimited from radar imagery by a given technique or methodology. A strip of unclassified radar imagery was selected that covered several heterogeneous land use regions and was accessible for field verification. The strip selected imaged an area approximately 12 miles wide and 1500 miles long from eastern Minnesota to northern Utah. The imagery was examined to ascertain which features visible on the imagery could be used to develop keys for use regionalization. As a result, the following combination of physical and cultural characteristics were selected: (1) surface configuration; (2) vegetation; (3) field pattern; (4) settlement pattern; and (5) road network. Dissert. Abstr.

N74-27767 Department of Energy, Mines and Resources, Ottawa (Ontario).
A THREE-COMPONENT AEROMAGNETIC SURVEY OF THE CANADIAN ARCTIC Publications of the Earth Physics Branch, Volume 44, No. 8
G. V. Haines and W. Hannaford 1974 25 p refs
Copyright. Avail: Issuing Activity

A three-component airborne magnetic survey of the Canadian Arctic was carried out in late 1970, at an average altitude of 3.7 km. The survey data are in the form of averages over 30 seconds of time, or approximately 3.5 km of flight track. The International Geomagnetic Reference Field (IGRF) was removed from these data, and the resulting residuals plotted as profiles. A 3rd-degree polynomial was fitted to the survey data by least-squares to determine how well the IGRF represents the average regional field over the area. The polynomial was also used to obtain vector residuals. Author

N74-27768*# Minnesota State Planning Agency, St. Paul.
LAND USE MANAGEMENT IN MINNESOTA Progress Report, 1 Mar. - 30 Apr. 1974
Joseph E. Sizer, Principal Investigator 30 Apr. 1974 3 p ERTS
(Contract NAS5-21801)
(E74-10547; NASA-CR-138296) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-27769*# Bureau of Sport Fisheries and Wildlife, Jamestown, N. Dak. Northern Prairie Wildlife Research Center.
UTILIZATION OF SKYLAB (EREP) SYSTEM FOR APPRAISING CHANGES IN CONTINENTAL MIGRATORY BIRD HABITAT Monthly Progress Report, Jun. 1974
Harvey K. Nelson, Principal Investigator Jun. 1974 2 p EREP
(NASA Order T-4114-B)
(E74-10555; NASA-CR-138445) Avail: NTIS HC $4.00 CSCL 06C

There are no author-identified significant results in this report.

N74-27770*# South Dakota State Univ., Brookings. Remote Sensing Inst.
[DEVELOP TECHNIQUES AND PROCEDURES, USING MULTISPECTRAL SYSTEMS, TO IDENTIFY FROM REMOTELY SENSED DATA THE PHYSICAL AND THERMAL CHARACTERISTICS OF PLANTS AND SOIL] Monthly Progress Report, May 1974
Victor I. Myers, Principal Investigator 20 Jun. 1974 2 p EREP
(Contract NAS9-13337)
(E74-10556; NASA-CR-138446) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-27771*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.

OIL POLLUTION DETECTION, MONITORING AND LAW ENFORCEMENT Quarterly Progress Report
Robert Horvath, Principal Investigator 19 Jun. 1974 2 p EREP
(Contract NAS9-13281)
(E74-10559; NASA-CR-138634; ERIM-101800-12-P; QPR-5) Avail: NTIS HC $4.00 CSCL 13B

There are no author-identified significant results in this report.

N74-27772*# Nevada Univ., Reno. Mackay School of Mines.
THE GREAT BASIN INVESTIGATION Monthly Progress Report, May 1974
Jack G. Quade, Principal Investigator May 1974 2 p EREP
(Contract NAS9-13274)
(E74-10561; NASA-CR-138636) Avail: NTIS HC $4.00 CSCL 08G

There are no author-indentified significant results in this report.

N74-27773*# Environmental Research and Technology, Inc., Lexington, Mass.
STUDY TO DEVELOP IMPROVED SPACECRAFT SNOW SURVEY METHODS USING SKYLAB/EREP DATA Quarterly Progress Report, 15 Mar. - 15 Jun. 1974
James C. Barnes, Principal Investigator Jun. 1974 4 p ref EREP
(Contract NAS9-13305)
(E74-10562; NASA-CR-138637; ERT-P-412-8; QPR-5) Avail: NTIS HC $4.00 CSCL 08L

There are no author-identified significant results in this report.

N74-27774*# Environmental Research Inst. of Michigan, Ann Arbor.
DEVELOPING PROCESSING TECHNIQUES FOR SKYLAB DATA Monthly Progress Report, May 1974
Richard F. Nalepka and William A. Malila, Principal Investigators 24 Jun. 1974 2 p EREP
(Contract NAS9-13280)
(E74-10563; NASA-CR-138638; ERIM-101900-32-L; MPR-15) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-27775*# Cornell Univ., Ithaca, N.Y. New York State Coll. of Agriculture and Life Sciences.
EVALUATION OF SKYLAB IMAGERY AS AN INFORMATION SERVICE FOR INVESTIGATING LAND USE AND NATURAL RESOURCES (SKYLAB) Progress Report, 1-31 May 1974
Ernest E. Hardy, Principal Investigator 31 May 1974 4 p EREP
(Contract NAS9-13364)
(E74-10564; NASA-CR-138639) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-27776*# California Earth Science Corp., Santa Monica.
FAULT TECTONICS AND EARTHQUAKE HAZARDS IN THE PENINSULAR RANGES, SOUTHERN CALIFORNIA Monthly Progress Report, May 1974
Paul M. Merifield and Donald L. Lamar, Principal Investigators 10 Jun. 1974 2 p EREP
(Contract NAS2-7698)
(E74-10565; NASA-CR-138640; MPR-12) Avail: NTIS HC $4.00 CSCL 08G

There are no author-identified significant results in this report.

N74-27777*# Delaware Univ., Newark. Coll. of Marine Studies.
MONITORING PHYSICAL AND CHEMICAL PARAMETERS OF DELAWARE BAY WATERS WITH AN ERTS-1 DATA COLLECTION PLATFORM Report on Significant Results
V. Klemas, Principal Investigator, C. A. Wethe, and A. S. Hanby 10 Jun. 1974 4 p ERTS
(Contract NAS5-21837)
(E74-10566; NASA-CR-138641) Avail: NTIS HC $4.00 CSCL 08J

The author has identified the following significant results. Evaluation of the probe performances during the initial phase indicates that the dissolved oxygen sensor available as part of the package is not sufficiently reliable for long term operation. The turbidity probe requires frequent visits to the site to maintain it in proper operating condition. The cost of these visits would have to be weighed against the information obtained. The conductivity/salinity, temperature, pH, and depth indicators have worked extremely well over the course of the study. Monthly cleanings would maintain all these probes in top operating condition. Currently the accuracy of each measurement returned via satellite is being compared to the accuracy of the probe reading and water samples analyzed in the laboratory.

N74-27778*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
[WETLANDS MAPPING OF MICHIGAN FROM ERTS DATA] Bimonthly Report, 1 Mar. - 30 Apr. 1974
F. C. Polcyn, F. J. Thomson, M. Leonard Bryan, I. J. Sattinger, W. A. Malila, R. F. Nalepka, C. T. Wezer, R. Horvath, and R. K. Vincent, Principal Investigators 30 Apr. 1974 4 p ERTS
(Contract NAS5-21783)
(E74-10588; NASA-CR-138693; BMR-9) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-27779*# Calspan Corp., Buffalo, N.Y.
S190 INTERPRETATION TECHNIQUES DEVELOPMENT AND APPLICATION TO NEW YORK STATE WATER RESOURCES Quarterly Report, 1 Mar. - 31 May 1974
Kenneth R. Piech, Principal Investigator 31 May 1974 3 p ref EREP
(Contract NAS9-13336)
(E74-10593; NASA-CR-138702; QR-5) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-27780*# Michigan State Univ., East Lansing.
INVESTIGATION OF SKYLAB DATA Monthly Plans and Progress Report, May 1974
Lester V. Manderscheid, Principal Investigator May 1974 4 p EREP
(Contract NAS9-13332)
(E74-10594; NASA-CR-138703) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-27781*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
GROUND PATTERN ANALYSIS IN THE GREAT PLAINS Bimonthly Progress Report, 1 Feb. - 30 Mar. 1974
John C. Davis, Fawwaz T. Ulaby, Principal Investigators, and James L. McNaughton Mar. 1974 9 p refs ERTS
(Contract NAS5-21822)
(E74-10595; NASA-CR-138704; Rept-2266-10) Avail: NTIS HC $4.00 CSCL 08B

The author has identified the following significant results. Spatial frequency analysis of ERTS-1 images appears to be useful in discriminating between large scale ground patterns in Kansas. Using parameters derived from the optical data processing of ERTS-1 images, sample areas from large physiographic categories have been accurately identified.

N74-27782*# Environmental Research Inst. of Michigan, Ann Arbor.
MAPPING EXPOSED SILICATE ROCK TYPES AND EXPOSED FERRIC AND FERROUS COMPOUNDS FROM A SPACE PLATFORM Quarterly Report, 8 Dec. 1973 - 8 Mar. 1974
Robert K. Vincent, Principal Investigator 14 Jun. 1974 2 p EREP
(Contract NAS9-13317)

(E74-10596; NASA-CR-138705; ERIM-102000-21-L; QR-4) Avail: NTIS HC $4.00 CSCL 08G

There are no author-identified significant results in this report.

N74-27783*# Naval Research Lab., Washington, D.C.
TERRAIN PROPERTIES AND TOPOGRAPHY FROM SKYLAB ALTIMETRY Monthly Progress Report, Apr. 1974
Allan Shapiro, Principal Investigator 11 Jun. 1974 1 p EREP
(NASA Order T-4716-B)
(E74-10597; NASA-CR-138706) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-27784*# National Marine Fisheries Service, Bay Saint Louis, Miss.
APPLICATION OF REMOTE SENSING FOR FISHERY RESOURCE ASSESSMENT AND MONITORING Monthly Progress Report, 10 May - 10 Jun. 1974
K. J. Savastano, Principal Investigator 10 Jun. 1974 3 p EREP
(NASA Order T-8217-B)
(E74-10598; NASA-CR-138707; MPR-13) Avail: NTIS HC $4.00 CSCL 08A

There are no author-identified significant results in this report.

N74-27785*# National Oceanic and Atmospheric Administration, Miami, Fla. Sea-Air Interaction Lab.
REMOTE DETECTION OF OCEAN FEATURES IN THE LESSER ANTILLES USING ERTS-1 DATA Final Report, Oct. 1972 - Apr. 1973
Kirby J. Hanson, Principal Investigator Apr. 1974 21 p refs
Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(NASA Order S-70246-AG)
(E74-10602; NASA-CR-138711) Avail: NTIS HC $4.25 CSCL 08J

The author has identified the following significant results. Photographic data received from the ERTS-1 satellite over the Lesser Antilles Islands show distinct ocean features on the leeward side of each island. Attempts to relate these features to ocean eddy formations with the aid of ground truth data proved unsuccessful. However, surface and upper air wind data indicate a good correlation with the size, shape, and downwind extent of the ocean features. Studies to date indicate strongly that these features result from horizontal differences in sea surface roughness due to the wind shadow effect of the islands. The results suggest that horizontal variations in the reflectance of the sea surface will make remote sensing of the ocean mixed layer more difficult than previously anticipated. The surface reflection seems to be large enough to mask the smaller horizontal variations in backscattered energy from the mixed layer.

N74-27786*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
DESIGN DATA COLLECTION WITH SKYLAB/EREP MICROWAVE INSTRUMENT S-193 Monthly Progress Report, Apr. 1974
Richard K. Moore, Fawwaz T. Ulaby, Principal Investigators, Cheng King, John Barr, Bruce Short, and Saad Ulaby Apr. 1974 4 p EREP
(Contract NAS9-13331)
(E74-10603; NASA-CR-138712) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-27787*# North Carolina State Univ., Raleigh. Dept. of Geosciences.
UTILIZATION OF EREP DATA IN GEOLOGICAL EVALUATION, REGIONAL PLANNING, FOREST MANAGEMENT, AND WATER MANAGEMENT IN NORTH CAROLINA Quarterly Progress Report, Mar. - May 1974
Charles W. Welby, Principal Investigator 14 Jun. 1974 5 p EREP
(Contract NAS9-13321)
(E74-10611; NASA-CR-138720) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-27788*# Battelle Columbus Labs., Ohio.
CALIBRATION AND EVALUATION OF SKYLAB ALTIMETRY FOR GEODETIC DETERMINATION OF THE GEOID Progress Report, 1-31 MAy 1974
A. G. Mourad, D. M. J. Fubara, Principal Investigators, and M. B. Kuhner 17 Jun. 1974 5 p ref EREP
(Contract NAS9-13276)
(E74-10612; NASA-CR-138721; PR-15) Avail: NTIS HC $4.00 CSCL 08E

There are no author-identified significant results in this report.

N74-27789*# Geological Survey, Denver, Colo.
EVALUATION OF ERTS-1 IMAGERY FOR MAPPING QUATERNARY DEPOSITS AND LANDFORMS IN THE GREAT PLAINS AND MIDWEST Progress Report, 1 Jul. - 31 Oct. 1973
Roger B. Morrison, Principal Investigator and George R. Hallberg (Iowa Geol. Survey, Iowa City) 1 Nov. 1973 8 p refs ERTS
(NASA Order S-70243-AG-1)
(E74-10614; NASA-CR-138723) Avail: NTIS HC $4.00 CSCL 08B

The author has identified the following significant results. Maps at 1:1 million scale exemplifying the first phase of the investigation (which consists of the identification and mapping of landform and land use characteristics and surficial geologic materials directly from the ERTS-1 images without use of additional data) were prepared. For areas that have not been mapped at 1:500,000 or larger scales, maps will provide the first moderately detailed information on landform features and surficial materials. Much of the information mapped is significant for exploration and development of ground (and, locally, petroleum) and for applications in engineering and environmental geology, including land use planning. Analysis of drainage patterns, stream-divide relations and land use patterns has revealed several possible moraine-controlled divices of middle and early Pleistocene age. One is an extension of the Cedar Bluffs moraine of southeastern Nebraska. Another of these divides may correspond to the terminus of Nebraska drift in the Kansas City study area. The trends of parts of various ancient filled valleys also have been identified by analysis of charges in width of the present stream valleys. The alinements of certain segments of stream valleys in Kansas and Missouri appear to be controlled by regional faults or other structural features.

N74-27790*# Geological Survey, Reston, Va.
IRON-ABSORPTION BAND ANALYSIS FOR THE DISCRIMINATION OF IRON-RICH ZONES Progress Report, 1 Jan. - 28 Feb. 1974
Lawrence C. Rowan, Principal Investigator 27 Mar. 1974 4 p ERTS
(NASA Order S-70243-AG-4)
(E74-10615; NASA-CR-138724) Avail: NTIS HC $4.00 CSCL 08G

There are no author-identified significant results in this report.

N74-27791*# Alaska Univ., Fairbanks. Dept. of Geology.
ERTS-A DATA AS A TEACHING AND RESEARCH TOOL IN THE DEPARTMENT OF GEOLOGY Final Report, Jul. 1972 - Mar. 1974
Donald Grybeck, Principal Investigator 11 Mar. 1974 20 p ERTS
(Contract NAS5-21833)
(E74-10617; NASA-CR-138726) Avail: NTIS HC $4.00 CSCL 08G

The author has identified the following significant results. The project was an attempt to integrate ERTS-1 data into teaching introductory, specialized, and graduate courses in the Department of Geology, University of Alaska. This data was to be utilized principally through a specially selected, high quality collection of black and white, and color 9.5 mosaics of the State of Alaska.

In completing these tasks, the data accumulated has proved highly useful in a variety of ways including: (1) discussions of the uses and availability of ERTS imagery; (2) as a medium for talking about and showing various areas of Alaska; (3) in discussing geology in general; and (4) as an aid in doing research and as possible research topics themselves. Use of ERTS-1 imagery in geology proved highly successful and its use is now an integral part of many courses.

N74-27792*# Stanford Univ., Calif. Remote Sensing Lab.
MULTISPECTRAL SIGNATURES IN RELATION TO GROUND CONTROL SIGNATURE USING NESTED SAMPLING APPROACH Progress Report, 3 Mar. - 3 May 1974
R. J. P. Lyon and F. R. Honey, Principal Investigators 3 May 1974 33 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21884)
(E74-10625; NASA-CR-138735) Avail: NTIS HC $4.75 CSCL 05B

There are no author-identified significant results in this report.

N74-27793*# Consiglio Nazionale delle Ricerche, Milan (Italy). Lab. per la Geofisica della Litosfera.
[VOLCANOLOGY, GEOLOGY, AND VEGETATION OF SICILY AND ITALY] Progress Report, period ending 31 Mar. 1974
R. Cassinis, G. M. Lechi, C. M. Marino, and A. M. Tonelli, Principal Investigators 8 May 1974 3 p Sponsored by NASA ERTS
(E74-10626; NASA-CR-138736; PR-1) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-27794*# TRW Systems Group, Redondo Beach, Calif.
ERTS IMAGE DATA COMPRESSION TECHNIQUE EVALUATION Final Report
Donald J. Spencer, Principal Investigator and C. L. May Apr. 1974 205 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21746)
(E74-10627; NASA-CR-138737) Avail: NTIS HC $13.25 CSCL 05B

There are no author-identified significant results in this report.

N74-27795*# Kansas State Univ., Manhattan. Evapotranspiration Lab.
WHEAT: ITS WATER USE, PRODUCTION AND DISEASE DETECTION AND PREDICTION Completion Report
Edward T. Kanemasu, Principal Investigator, D. Lenhert, C. Niblett, H. Manges, and M. G. Eversmeyer 5 Feb. 1974 238 p refs ERTS
(Contract NAS5-21822)
(E74-10632; NASA-CR-138742; Rept-2263-3) Avail: NTIS HC $15.00 CSCL 02C

The author has identified the following significant results. Discussed in this report are: (1) the effects of wheat disease on water use and yield; and (2) the use of ERTS-1 imagery in the evaluation of wheat growth and in the detection of disease severity. Leaf area index was linearly correlated with ratios MSS4:MSS5 and MSS5:MSS6. In an area of severe wheat streak mosaic virus infected fields, correlations of ERTS-1 digital counts with wheat yields and disease severity levels were significant at the 5% level for MSS bands 4 and 5 and band ratios 4/6 and 4/7. Data collection platforms were used to gather meteorological data for the early prediction of rust severity and economic loss. For individual titles, see N74-27796 through N74-27800.

N74-27796* Kansas State Univ., Manhattan.
INTRODUCTION
In its Wheat: Its Water Use, Production and Disease Detection and Prediction 5 Feb. 1974 p 1-69 refs ERTS (For availability see N74-27795 17-13)
CSCL 02C

The author has identified the following significant results. The objectives of the investigation were: (1) to evaluate the effect of water stress, disease, and leaf area on the reflectance characteristics of wheat; (2) to evaluate disease losses in terms of yield and water use; and (3) to predict disease severity and economic loss.

N74-27797* Kansas State Univ., Manhattan.
ERTS-1 DATA COLLECTION SYSTEMS USED TO PREDICT WHEAT DISEASE SEVERITIES
E. T. Kanemasu, H. Schimmelpfenning, E. Chin Choy, M. G. Eversmeyer, and D. Lenhert *In its* Wheat: Its Water Use, Production and Disease Detection and Prediction 5 Feb. 1974 13 p refs ERTS (For availability see N74-27795 17-13)
(Contrib-1387; Contrib-595) CSCL 02C

The author has identified the following significant results. The feasibility of using the data collection system on ERTS-1 to predict wheat leaf rust severity and resulting yield loss was tested. Ground-based data collection platforms (DCP'S), placed in two commercial wheat fields in Riley County, Kansas, transmitted to the satellite such meteorological information as maximum and minimum temperature, relative humidity, and hours of free moisture. Meteorological data received from the two DCP'S from April 23 to 29 were used to estimate the diesease progress curve. Values from the curve were used to predict the percentage decrease in wheat yields resulting from leaf rust. Actual decrease in yield was obtained by applying a zinc and maneb spray (5.6 kg/ha) to control leaf rust, then comparing yields of the controlled (healthy) and the noncontrolled (rusted) areas. In each field a 9% decrease in yield was predicted by the DCP-derived data; actual decreases were 12% and 9%.

N74-27798* Kansas State Univ., Manhattan.
SEASONAL CANOPY REFLECTANCE PATTERNS OF WHEAT, SORGHUM AND SOYBEAN
E. T. Kanemasu *In its* Wheat: Its Water Use, Production and Disease Detection and Prediction 5 Feb. 1974 20 p refs ERTS (For availability see N74-27795 17-13)
(Contrib-1385) CSCL 20F

The author has identified the following significant results. Reflectance characteristics of agronomic crops are of major importance in the energy exchanges of a surface. In addition, unique reflectance patterns may be an aid in crop identification by means of remote sensing. This study suggests that the ratio of the reflectances of the 545-nm to to the 655-nm wavebands provides information about the viewed surface, regardless of the crop. The reflectance ratio is less than unity early and late in the growing season. For all crops studied, the ratio closely followed crop growth and development and appeared to be more desirable than the near-infrared reflectance as an index of growth.

N74-27799* Kansas State Univ., Manhattan.
FLEXIBLE DCP INTERFACE
E. T. Kanemasu and H. Schimmelpfenning *In its* Wheat: Its Water Use, Production and Disease Detection and Prediction 5 Feb. 1974 24 p ERTS (For availability see N74-27795 17-13)
(Contrib-1397) CSCL 05B

The author has identified the following significant results. A user of an ERTS data collection system (DCS) must supply the sensors and signal-conditioning interface. The electronic interface must be compatible with the NASA-furnished data collection platform. A universal signal-conditioning system for use with a wide range of environmental sensors is described. The interface is environmentally and electronically compatible with the DCP and has operated satisfactorily for a complete winter wheat growing season in Kansas.

N74-27800* Kansas State Univ., Manhattan. Dept. of Agricultural Engineering.
PREDICTING SOIL MOISTURE AND WHEAT VEGETATIVE GROWTH FROM ERTS-1 IMAGERY M.S. Thesis
John Wayne Krupp *In its* Wheat: Its Water Use, Production and Disease Detection and Prediction 5 Feb. 1974 70 p refs ERTS (For availability see N74-27795 17-13)
CSCL 02C

The author has identified the following significant results. Study results indicate: (1) Vegetative growth was best predicted by a linear relationship between leaf area index and the radio of band 4 to band 5. All significant soil moisture effects were

growth, measured by leaf area index, was one of the necessary inputs in evaluating the winter wheat crop coefficient from March to maturity.

N74-27801*# National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
REMOTE SENSING OF OCEAN CURRENT BOUNDARY LAYER Monthly Report, May 1974
George A. Maul, Principal Investigator May 1974 2 p ref EREP
(NASA Order T-4713-B)
(E74-10633; NASA-CR-138743; MR-11) Avail: NTIS HC $4.00 CSCL 08J
There are no author-identified significant results in this report.

N74-27802*# Grambling Coll., La. Dept. of Physics.
STUDY OF LOW FREQUENCY HYDROMAGNETIC WAVES USING ATS-1 DATA Semiannual Status Report
W. D. Cummings 19 Dec. 1973 13 p
(Grant NGR-19-011-007)
(NASA-CR-138797) Avail: NTIS HC $4.00 CSCL 08N
The low-frequency oscillations observed at ATS-1 are the result of an attempt by the magnetospheric plasma to conserve its angular momentum as it convects through the magnetosphere. Author

N74-27803*# Utah Univ., Salt Lake City. Dept. of Electrical Engineering.
SURVEY OF LITERATURE ON CONVECTIVE HEAT TRANSFER COEFFICIENTS AND RECOVERY FACTORS FOR HIGH ATMOSPHERE THERMOMETRY Progress Report
Syung Chung Jul. 1973 108 p refs
(Grant NGR-45-003-025)
(NASA-CR-138747; UTEC-MR-73-136) Avail. NTIS HC $8.50 CSCL 04A
Heat transfer phenomena of rarefied gas flows is discussed based on a literature survey of analytical and experimental rarefied gas dynamics. Subsonic flows are emphasized for the purposes of meteorological thermometry in the high atmosphere. The heat transfer coefficients for three basic geometries are given in the regimes of free molecular flow, transition flow, slip flow, and continuum flow. Different types of heat phenomena, and the analysis of theoretical and experimental data are presented. The uncertainties calculated from the interpolation rule compared with the available experimental data are discussed. The recovery factor for each geometry in subsonic rarefied flows is also given.
Author

N74-27804*# Minnesota Univ., Minneapolis. College of Forestry.
REMOTE SENSING APPLICATIONS TO FOREST VEGETATION CLASSIFICATION AND CONIFER VIGOR LOSS DUE TO DWARF MISTLETOE Remote Sensing Applications in Forestry. Final Report
Robert W. Douglass, Merle P. Meyer, and D. W. French Berkeley, Calif. Calif. Univ. Forestry Remote Sensing Lab. 30 Sep. 1972 102 p refs Prepared for Calif. Univ., Berkeley. Forestry Remote Sensing Lab. in cooperation with Dept. of Agric. Forest Serv.
(NASA Order R-09-038-002)
(NASA-CR-138806) Avail: NTIS HC $8.25 CSCL 02F
Criteria was established for practical remote sensing of vegetation stress and mortality caused by dwarf mistletoe infections in black spruce subboreal forest stands. The project was accomplished in two stages: (1) A fixed tower-tramway site in an infected black spruce stand was used for periodic multispectral photo coverage to establish basic film/filter/scale/season/weather parameters; (2) The photographic combinations suggested by the tower-tramway tests were used in low, medium, and high altitude aerial photography. Author

N74-27805*# Louisiana State Univ., Baton Rouge. Div. of Engineering Research.
REMOTE SENSING AS AN AID TO ROUTE EVALUATION
(NASA-CR-138748; AOP-2) Avail: NTIS HC $5.50 CSCL 08B
Aerial photography in the form of color infrared and color positive transparencies was used as an aid for evaluation of the route proposed for relocated Louisiana Highway 1, between LaRose and Golden Meadows, in South Louisiana. Author

N74-27806*# Cornell Univ., Ithaca, N.Y.
CORNELL UNIVERSITY REMOTE SENSING PROGRAM Semiannual Status Report, 1 Dec. 1973 - 31 May 1974
Ta Liang, Donald J. Belcher, and Arthur J. McNair Jun. 1974 115 p refs
(Contract NGL-33-010-171)
(NASA-CR-138749) Avail: NTIS HC $8.75 CSCL 05B
The major activities of the program staff from December 1, 1973 to May 31, 1974 are reported and include: (1) communication and instruction; (2) data and facilities; (3) research completed; (4) research in progress; (5) selected correspondence; (6) grant sponsored travel; and (7) seminars and newsletters. Detailed information and maps are given for the following selected projects: (1) ERTS mapping of waterways in the Tug Hill region of New York State; (2) photo-archeological investigation of Great Gully, New York; and (3) evaluation of selected highway impacts using aerial photography. A.A.D.

N74-27807# National Oceanic and Atmospheric Administration, Boulder, Colo.
IONOSPHERIC SCINTILLATION PREDICTION FOR GOES
Joseph H. Pope Jan. 1973 36 p refs
(ARPA Order 2019)
(NOAA-TR-ERL-257-SEL-24) Avail: SOD HC $0.75 CSCL 04A
A world wide model of ionospheric irregularities giving rise to scintillations was developed. This model takes into consideration diurnal, seasonal, and solar variations as well as the dependence on geomagnetic latitude, frequency, and the geometry between the transmitter and the receiver. This model was used to make computations appropriate for the GOES system, assuming the satellite to be parked on 100 deg W longitude. The results show that for low solar activity periods serious scintillations will occur only within about + or - 10 degrees of the geomagnetic equator. During moderately active periods stations located in the vicinity of the auroral zones will also be affected. The worst case condition occurs for sunspot number 200, during the equinox, and at midnight, on the longitude of the geostationary satellite. Author

N74-27808# Stanford Research Inst., Menlo Park, Calif.
INFRARED EMISSIVITIES AND UPPER-TROPOSPHERIC CLOUD MOTIONS Final Report
Paul A. Davis, Rex G. Hadfield, and Eldon J. Wiegman Aug. 1973 62 p refs
(Contract NOAA-37131; SRI Proj. ERU-2014)
Avail: NTIS HC $6.25
Visible data from geosynchronous satellites and digital infrared data from a polar orbiting satellite were studied with respect to clouds in the upper troposphere. Radiometric cloud heights were compared with heights representing the level of best fit (LBF) of the cloud motion vector to the observed wind. When the radiometric height was less than the LBF, computed effective emissivities ranged from 0.1 to 1.0 for the selected cloud targets. Many of the high cloud targets had radiometric top heights exceeding the LBFs; for these opaque targets even the radiometric height may not be definitive of the optimum vertical position of the cloud motion vector. Author

N74-27809# Joint Publications Research Service, Arlington, Va.
BASIC PROBLEMS OF ANTARCTICA EXPLOITATION
S. B. Slevich 6 Jun. 1974 30 p refs Transl. into ENGLISH from the pamphlet "Osnovnyye Problemy Osvoyeniya Antarktiki" Leningrad, Jun. 1973 p 1-32
(JPRS-62180) Avail: NTIS HC $4.50
The Antarctica and problems connected with its development and exploitation are discussed. Author

N74-27810*# Scientific Translation Service, Santa Barbara, Calif.
SPACE-TIME CHARACTERISTICS OF THE FIELD OF LONG WAVE RADIATION IN THE ATMOSPHERE
N. A. Zaytseva, G. N. Kostyanoy, and V. I. Shlyakov Washington NASA Jun. 1974 18 p refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 4, 1974 p 67-75
(Contract NASw-2483)
(NASA-TT-F-15689) Avail: NTIS HC $4.00 CSCL 20N

Seasonal variations of a long-wave radiation field over the territory of the U.S.S.R. are analyzed. Seasonal charts of the fields of ascending and descending long-wave radiative fluxes are presented. Curves of the summer time and winter time vertical profiles are presented. A plot of the season variations in ascending and descending fluxes of long wave radiation at various barometric levels is developed. Author

N74-27811*# International Business Machines Corp., Huntsville, Ala. Electronics Systems Center.
APPLICATION OF REMOTE SENSING TO HYDROLOGY Final Report
Reuben Ambaruch and John W. Simmons Sep. 1973 114 p refs
(Contract NAS8-14000)
(NASA-CR-120278; IBM-73W-00387) Avail: NTIS HC $8.75 CSCL 08H

Streamflow forecasting and hydrologic modelling are considered in a feasibility assessment of using the data produced by remote observation from space and/or aircraft to reduce the time and expense normally involved in achieving the ability to predict the hydrological behavior of an ungaged watershed. Existing watershed models are described, and both stochastic and parametric techniques are discussed towards the selection of a suitable simulation model. Technical progress and applications are reported and recommendations are made for additional research. A.A.D.

N74-27812# Kanner (Leo) Associates, Redwood City, Calif.
ENVIRONMENTAL IMPACT OF VARIOUS TYPES OF SPACE HEATING IN 1980
Nov. 1973 3 p ref Transl. into ENGLISH of the publ. "Umweltbelastung durch Verschiedene Raumheizungen im Jahre 1980" Sponsored by EPA
(APTIC-52274; TR-173-74) Avail: NTIS HC $4.00

The environmental impact of any heating system due to heat and pollutant emission is discussed. The advantages and disadvantages to several heating systems are also reviewed; these systems are compared with their projected energy consumption for the year 1980. J.A.M.

N74-27813*# International Business Machines Corp., Huntsville, Ala.
A STUDY OF REMOTE SENSING AS APPLIED TO REGIONAL AND SMALL WATERSHEDS. VOLUME 1: SUMMARY REPORT Final Report
Jun. 1974 46 p refs
(Contract NAS5-21942)
(NASA-CR-139031; IBM-74W-00175) Avail: NTIS HC $5.50 CSCL 08H

The accuracy of remotely sensed measurements to provide inputs to hydrologic models of watersheds is studied. A series of sensitivity analyses on continuous simulation models of three watersheds determined: (1)Optimal values and permissible tolerances of inputs to achieve accurate simulation of streamflow from the watersheds; (2) Which model inputs can be quantified from remote sensing, directly, indirectly or by inference; and (3) How accurate remotely sensed measurements (from spacecraft or aircraft) must be to provide a basis for quantifying model inputs within permissible tolerances. Author

N74-27814# Joint Publications Research Service, Arlington, Va.
STATISTICAL METHODS OF STUDYING NATURAL OBJECTS
G. A. Sergeyev and D. A. Yanutsh 17 Jun. 1974 118 p refs Transl. into ENGLISH of the book "Statisticheskiye Metody Issledovaniya Prirodnykh Obyektov" Leningrad, Gidrometeoizdat, 1973 300 p
(JPRS-62251) Avail: NTIS HC $9.00

An examination of methods of statistical analysis of natural phenomena based on the theory of stochastic processes is reported. Author

N74-27815*# Grambling Coll., La. Dept. of Physics.
STUDY OF LOW FREQUENCY HYDROMAGNETIC WAVES USING ATS-1 DATA Semiannual Status Report
W. D. Cummings 26 Jun. 1974 36 p refs
(Grant NGR-19-011-007)
(NASA-CR-138802) Avail: NTIS HC $5.00 CSCL 08N

Summaries are presented on the use of ATS-1 data to analyze low frequency oscillations of the earth's magnetic field and hydromagnetic wave polarization. For individual titles, see N74-27816 through N74-27821.

N74-27816* Grambling Coll., La.
STUDY OF LOW FREQUENCY HYDROMAGNETIC WAVES USING ATS-1 DATA
W. D. Cummings *In its* Study of Low Freq. Hydromagnetic Waves using ATS-1 Data 26 Jun. 1974 6 p (For availability see N74-27815 17-13)
CSCL 08N

An analysis was made of ATS-1 data to determine at what point in the magnetic storm recovery phase are oscillations most likely to begin. The catalog of hourly values of equatorial Dst was used to determine the time of main phase decrease, and a catalog of oscillations from January to May 1968 to determine onset time as observed by ATS-1. For each oscillation event at ATS-1, the nearest prior main phase decrease with a magnitude of at least -35 gamma was determined, and the time difference between the onset of the event at ATS-1 and the time of main phase decrease was measured. The resulting data indicate that the most probable time to observe onset of transverse oscillations is within 24 hours after the main phase decrease. E.H.W.

N74-27817* Grambling Coll., La.
CATALOG OF LOW FREQUENCY OSCILLATIONS OF THE EARTH'S MAGNETIC FIELD AS OBSERVED AT ATS-1 DURING JANUARY 1968
W. D. Cummings and D. Lyons *In its* Study of Low Freq. Hydromagnetic Waves using ATS-1 Data 26 Jun. 1974 6 p (For availability see N74-27815 17-13)
CSCL 08N

A catalog of ATS-1 observed magnetic field oscillations is presented. The catalog holds only those events with a duration of at least ten minutes and with a frequency that remains roughly constant. Events are distinguished on the basis of the frequency of oscillations. A comparison was made between ATS-1 data and other ground and satellite magnetometer data. E.H.W.

N74-27818* Grambling Coll., La.
CATALOG OF LOW FREQUENCY OSCILLATIONS OF THE EARTH'S MAGNETIC FIELD AS OBSERVED AT ATS-1 DURING FEBRUARY 1968
W. D. Cummings, F. Mason, and D. Lyons *In its* Study of Low Freq. Hydromagnetic Waves using ATS-1 Data 26 Jun. 1974 5 p (For availability see N74-27815 17-13)
(Publ-39-73-2) CSCL 08N
For abstract, see N74-27815.

N74-27819* Grambling Coll., La.
CATALOG OF LOW FREQUENCY OSCILLATIONS OF THE EARTH'S MAGNETIC FIELD AS OBSERVED AT ATS-1 DURING MARCH 1968
W. D. Cummings and F. Mason *In its* Study of Low Freq. Hydromagnetic Waves using ATS-1 Data 26 Jun. 1974 7 p (For availability see N74-27815 17-13)
(Publ-39-72-6) CSCL 08N
For abstract, see N74-27815.

N74-27820* Grambling Coll., La.
CATALOG OF LOW FREQUENCY OSCILLATIONS OF THE EARTH'S MAGNETIC FIELD AS OBSERVED AT ATS-1 DURING APRIL 1968
W. D. Cummings, F. Mason, and D. Lyons *In its* Study of Low Freq. Hydromagnetic Waves using ATS-1 Data 26 Jun. 1974 5 p (For availability see N74-27815 17-13)
(Publ-39-73-1) CSCL 08N

For abstract, see N74-27815.

N74-27821* Grambling Coll., La.
CATALOG OF LOW FREQUENCY OSCILLATIONS OF THE EARTH'S MAGNETIC FIELD AS OBSERVED AT ATS-1 DURING MAY 1968
W. D. Cummings and D. Lyons *In its* Study of Low Freq. Hydromagnetic Waves using ATS-1 Data 26 Jun. 1974 5 p (For availability see N74-27815 17-13)
CSCL 08N

For abstract, see N74-27815.

N74-27822*# Scientific Translation Service, Santa Barbara, Calif.
INTRODUCTION TO THE ELECTROMAGNETISM OF THE SEA
P. Halley Washington NASA Jun. 1974 81 p refs Transl. into ENGLISH from the French report AGARD-LS-61
(Contract NASw-2483)
(NASA-TT-F-15658; AGARD-LS-61) Avail: NTIS HC $7.25 CSCL 08J

The factors which influence the propagation of electromagnetic waves through the ocean and through the air-ocean interface are discussed in detail including numerical data. The effects include refraction, absorption, reflection. The entire frequency range is examined up to the optical frequencies. Maxwell's equations, wave propagation in the ocean, theory of electrolyte anomalies, electrophoesis, Clausius-Moretti law and Debye term are discussed. Author

N74-27823*# Kanner (Leo) Associates, Redwood City, Calif.
THERMAL FLUX AND AN ESTIMATE OF THE COEFFICIENT OF HELIUM RELEASE FROM THE EARTH'S CRUST INTO THE ATMOSPHERE
Yu. P. Bulashevich Washington NASA Jul. 1974 7 p refs Transl. into ENGLISH from Dokl. Akad. Nauk. SSSR (Moscow), v. 212, 1 Oct. 1973 p 854-855
(Contract NASw-2481)
(NASA-TT-F-15763) Avail: NTIS HC $4.00 CSCL 08G

Discussed is the coefficient of helium release into the atmosphere from the earth's crust which is based on the gas dynamics in the upper layers of the atmosphere. This coefficient is equal to the ratio of the escape rate to the generation rate of He2 in the earth's crust and upper mantle. Formulas are given based on previous calculations, for defining the coefficient of helium release more exactly. However, further development of a thermal model of the earth is still required. Author

N74-27824*# Utah Univ., Salt Lake City. Dept. of Electrical Engineering.
THERMOMETRIC CONVECTION COEFFICIENTS FOR ROCKET METEOROLOGICAL SENSORS (TABLES) Interim Report
Forrest L. Staffanson Jun. 1974 33 p refs
(Grant NGL-45-003-025)
(NASA-CR-138907; UTEC-MR-74-090) Avail: NTIS HC $4.75 CSCL 04A

Values of the convective heat transfer coefficient h, and the recovery factor r, for miniature beads, fine wires, and films in rarefied air flow are shown. Data provide a standard reference for computing consistent operational corrections to rocket meteorological measurements, and for predicting the performance of existing and proposed sensor systems. Author

N74-27825# Geological Survey, Reston, Va.
REMOTE SENSING PLATFORMS
Alden P. Colvocoresses 1974 81 p refs
(USGS-Circ-693) Avail: NTIS HC $7.25; free on application to the US Geological Survey, Reston, Va. 22092 CSCL 14E

Typical vehicles which carry remote sensors into the atmosphere or beyond into space are described and illustrated. Airborne platforms and spacecraft are selected from vehicles which have demonstrated acceptance and capability, or have been defined for future remote sensing missions. Except for an unique British kite balloon, only American platforms are covered. Remote sensing of the Earth is the prime consideration, but sensing of other planets and moons is also considered. Author

N74-27826# Massachusetts Inst. of Tech., Cambridge.
SECOND ANNUAL SEA GRANT LECTURE AND SYMPOSIUM
18 Oct. 1973 46 p refs Symp. held at Cambridge, Mass.
(MITSG-74-7) Avail: NTIS HC $5.50

The use of the ocean as a world energy source is discussed. Special attention was given to offshore oil. Heat disposal in ocean waters was also discussed. For individual titles, see N74-27827 through N74-27829.

N74-27827 Westinghouse Electric Corp., Pittsburgh, Pa.
WORLD ENERGY AND THE OCEANS
William E. Shoupp *In* MIT Second Ann. Sea Grant Lecture and Symp. 18 Oct. 1973 10 p (For availability see N74-27826 17-13)

Energy sources and means by which they are converted to usable energy forms are outlined. Special attention was given to means and programs by which these sources are utilized. Data cover: (1) location, evaluation, and utilization of known reserves, (2) removal of nonessential constraints that limit construction and operation of atomic power plants, (3) increased technical capability in substituting electric power for more than current uses, and (4) location of large electric power generating stations near the ocean where coolants for the system are provided by the ocean. The alternate energy sources of coal gasification and ethanol are discussed. E.H.W.

N74-27828 Massachusetts Inst. of Tech., Cambridge.
KEY ISSUES IN OFFSHORE OIL
John W. Devanney, III *In its* Second Ann. Sea Grant Lecture and Symp. 18 Oct. 1973 14 p (For availability see N74-27826 17-13)

The Georges Bank analyses of offshore oil, oil quality, and environmental damage caused by oil spillage are presented. Data cover biological effect of oil, particularly toxicity, spill statistics, hydrocarbon plumes emanating from oil water seperator discharges and refinery wastewater outfalls, and fish and larval kill possible from a spill. Economic factors associated with offshore and nearshore oil are discussed. E.H.W.

N74-27829 Massachusetts Inst. of Tech., Cambridge.
INNOVATIONS IN HEAT DISPOSAL IN THE OCEANS
Donald R. F. Harleman *In its* Second Ann. Sea Grant Lecture and Symp. 18 Oct. 1973 16 p refs (For availability see N74-27826 17-13)

An assessment was made of the heat assimilative capacity of coastal and ocean waters. Attempts were made to devise ways of discharging waste heat that will have a minimal impact on the marine ecology. E.H.W.

N74-27830*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
FLOOD HAZARDS STUDIES IN THE MISSISSIPPI RIVER BASIN USING REMOTE SENSING
Albert Rango and Arthur T. Anderson Apr. 1974 44 p refs Submitted for publication
(NASA-TM-X-70682; X-913-74-125) Avail: NTIS HC $5.25 CSCL 08H

The Spring 1973 Mississippi River flood was investigated using remotely sensed data from ERTS-1. Both manual and automatic analyses of the data indicated that ERTS-1 is extremely useful as a regional tool for flood mamagement. Quantitative estimates of area flooded were made in St. Charles County, Missouri and Arkansas. Flood hazard mapping was conducted in three study areas along the Mississippi River using pre-flood ERTS-1 imagery enlarged to 1:250,000 and 1:100,000 scale. Initial results indicate that ERTS-1 digital mapping of flood prone areas can be performed at 1:62,500 which is comparable to some conventional flood hazard map scales. Author

N74-27831*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
RANDOM-ACCESS TECHNIQUE FOR MODULAR BATHYMETRY DATA STORAGE IN A CONTINENTAL SHELF WAVE REFRACTION PROGRAM
Lamont R. Poole Washington Jul. 1974 23 p ref
(NASA-TM-X-3018; L-9432) Avail: NTIS HC $3.00 CSCL 08C

A study was conducted of an alternate method for storage and use of bathymetry data in the Langley Research Center and Virginia Institute of Marine Science mid-Atlantic continental-shelf wave-refraction computer program. The regional bathymetry array was divided into 105 indexed modules which can be read individually into memory in a nonsequential manner from a peripheral file using special random-access subroutines. In running a sample refraction case, a 75-percent decrease in program field length was achieved by using the random-access storage method in comparison with the conventional method of total regional array storage. This field-length decrease was accompanied by a comparative 5-percent increase in central processing time and a 477-percent increase in the number of operating-system calls. A comparative Langley Research Center computer system cost savings of 68 percent was achieved by using the random-access storage method. Author

N74-27832*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
IDENTIFICATIONS OF THE POLAR CAP BOUNDARY AND THE AURORAL BELT IN THE HIGH ALTITUDE MAGNETOSPHERE: A MODEL FOR FIELD ALIGNED CURRENTS
Masahisa Sugiura Jun. 1974 40 p refs Submitted for publication
(NASA-TM-X-70694; X-625-74-195) Avail: NTIS HC $5.00 CSCL 04A

Using the OGO-5 fluxgate magnetometer data, the polar cap boundary is identified in the high altitude magnetosphere by a sudden transition from a dipolar field to a more tail like configuration. The basic pattern of the magnetic field variations observed during the satellite's traversal of the auroral belt is presented. This pattern shows the existence of a field aligned current layer on the equator side of the polar cap boundary. Currents flow in the opposite directions in the two field aligned current layers. The current directions in these layers as observed by OGO-5 in the high-altitude magnetosphere are the same as those observed at low altitudes by the polar orbiting TRIAD satellite. The magnetic field in the region where the lower latitude field aligned current layer is situated is essentially meridional. Thus the equatorial current closure of this current system must be via the equatorial current sheet. The two field aligned current systems, one at the polar cap boundary and the other on the low latitude side of the auroral belt, are coupled through the Pedersen current in the ionosphere. Author

N74-27833# Texas Univ., Austin. Center for Particle Theory.
IMPLICATIONS OF THE SHADOW EFFECT IN THEORIES OF GRAVITATION
C. C. Chiang, J. J. Dykla, and A. E. Hwang 1973 14 p refs (Contract AT(40-1)-3992)
(ORO-3992-156; CPT-200) Avail: NTIS HC $3.00

Following the idea of the theory of shadow states in quantum field theory, a Newtonian theory and a Whitehead's theory of gravitation are constructed with shadow, gravitational potentials. As a heuristic approach, Einstein's theory of gravitation is modified by introducing the shadow effect. This is achieved by using the effective mass distribution which arises in the Newtonian theory of gravitation with shadow effect as the only nonvanishing component of the stress-energy momentum tensor of a static point source. It is found that in the static spherically symmetric solution of Einstein's equations, with proper choice of the new dynamical parameter, there is no surface of infinite red shift and the formation of a black hole can be avoided, leaving a naked singularity at the origin. Author (NSA)

N74-27834# Brookhaven National Lab., Upton, N.Y. Dept. of Applied Science.
COMPARISON OF WIND SPEED AND TURBULENCE MEASUREMENTS MADE BY A HOT FILM PROBE AND A BIVANE IN THE ATMOSPHERIC SURFACE LAYER
S. SethuRaman and R. M. Brown 1973 13 p refs Presented at AM. Chem. Soc. 2d Joint Conf. on Sensing of Environ. Pollutants, Washington, D. C., 10 Dec. 1973 Sponsored by AEC
(BNL-18431; Conf-731205-4) Avail: NTIS HC $3.00

Two independent systems for determining wind speed and turbulence levels are being used in an on-shore diffusion study on Long Island near Brookhaven National Laboratory. Results obtained from the two instrument systems are compared to illustrate the differences in the measured values of the vector wind, mean wind speed, variance, turbulence level and energy spectra. Details of the physical characteristics and relative advantages of a commercial vector vane and a three-dimensional hot-film sensor are also presented. Measurements of the mean wind speed and the turbulence level compared well. The vector vane underestimated spectral densities for frequencies above 1 hertz. Author (NSA)

N74-27835# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
AGE ESTIMATES OF STRATOSPHERIC AIR
E. R. Reiter Aug. 1973 15 p refs
(Contract AT(11-1)-1340)
(COO-1340-35) Avail: NTIS HC $3.00

It is shown that careful consideration of P-32/Be-7 ratios (both isotopes being generated in the atmosphere by cosmic radiation) not only yields information on the stratospheric or tropospheric origin of air masses. These ratios may also be used to determine the residence time in the stratosphere of tropospheric air that underwent upward transport through the tropopause and reentered the troposphere at a later date. Author (NSA)

N74-27836# Defense Mapping Agency Aerospace Center, St. Louis, Mo. Technical Translation Branch.
SHIFTING OF THE LEVEL SURFACE (THE GEOID) AS A RESULT OF TOPOGRAPHIC REDUCTION
E. M. Shatalova Apr. 1974 13 p refs Transl. into ENGLISH from Geod., Kartografiya i Aerofotosyemka (Lvov), no. 14, 1971 p 80-83
(AD-778246; DMAAC-TC-2011) Avail: NTIS CSCL 08/5

The purpose of the work is a more detailed study of the problem concerning the deformation of the geoid's figure under the influence of topographic reduction, compilation of a table of deformations, and as far as possible taking into account more accurately all masses whose reduction causes the shifting of the geoid's level. Author (GRA)

N74-27837# Naval Intelligence Support Center, Washington, D.C. Translation Div.
DETERMINING THE GEOMETRIC CHARACTERISTICS OF A SEA SURFACE BY THE SIGNAL SCATTERED FROM IT
A. M. Nedelyaev, V. P. Prakhov, and T. A. Osetrova 13 Dec. 1973 9 p refs Transl. into ENGLISH from Tr. Energ. Inst. (Moscow), no. 119, 1972 p 80-83
(AD-777436; NISC-Trans-3481) Avail: NTIS CSCL 08/3

Attempts were made to determine the geometric parameters of the sea surface which could be used in a model composed of two types of roughness: major waves and the ripple which covers them. The problem of scattering of electromagnetic waves impinging on a complex surface is solved either by a Kirchhoff approximation or by the Kirchhoff method in combination with the perturbation theory. E.H.W.

N74-27838# Army Cold Regions Research and Engineering Lab., Hanover, N.H.
ARCTIC TERRAIN CHARACTERISTICS DATA BANK
S. J. Mock, V. LaGarde, and W. B. Tucker Mar. 1974 47 p refs
(ARPA Order 1615)
(AD-777551; CRREL-TR-247) Avail: NTIS CSCL 08/6

An arctic terrain characteristics data bank was established as part of a program to evaluate advanced surface effect vehicle (SEV) designs for Arctic use. The data bank contains approximately 4300 kilometers of terrain profiles in digital form acquired with an airborne laser profilometer system, and approximately 50 digital terrain maps for areas ranging from 0.01 sq km to 1 sq km, photogrammetrically derived from aerial photography. The development and data processing techniques are described along with descriptions of the data bank contents. Author (GRA)

N74-27839# Epsilon Labs., Bedford, Mass.
STRATOSPHERIC BALLOON AEROSOL PARTICLE COUNTER MEASUREMENTS Final Report, 2 Feb. - 30 Nov. 1973
Henry A. Miranda, Jr., John Dulchinos, and Henry P. Miranda Nov. 1973 77 p refs

(Contract F19628-73-C-0138; AF Proj. 7621)
(AD-777135; FR-2001-73; AFCRL-TR-73-0700) Avail: NTIS CSCL 04/1

A balloon-borne submicron aerosol counter developed under previous Air Force contracts was successfully flown on three stratospheric balloon experiments over Holloman AFB, New Mexico in May of 1973. The results indicate that particulate matter at higher levels is characterized by markedly different scattering parameters than is the case at lower levels. This effect is manifested in the form of exceedingly sharp cut-offs in the size distribution at about 0.4 micrometer diameter, which is only observed above 23 km. The extent to which this sharp cut-off is attributable either to nonspherical particles or to index of refraction uncertainties rather than to the actual size distribution, is a matter of conjecture. Recommendations for equipment modifications tending to eliminate these ambiguities, are discussed. Also described here are the several hardware and software modifications incorporated in the system under the present contract in preparation for these flights. Author (GRA)

N74-27840# Naval Intelligence Support Center, Washington, D.C. Translation Div.
LASER SOUNDING OF THE ATMOSPHERE
V. E. Zuev 13 Dec. 1973 20 p ref Transl. into ENGLISH from Priroda (Moscow), no. 10, 1972 p 86-93
(AD-777438; NISC-Trans-3483) Avail: NTIS CSCL 04/1

The advantages of using laser pulse energy for atmospheric sounding, and the current state-of-art of the method are discussed. The principles of lidar operation and its assembly are shown, and preliminary results for the following are given: (1) aerosol sounding of the troposphere and stratosphere; (2) determination of atmospheric transparencies; (3) cloud sounding; (4) sounding of a polluted atmosphere; and (5) determination of parameters of the atmosphere and gas concentrations. Future possibilities of laser sounding methods are also discussed. A.A.D.

N74-27841# Army Foreign Science and Technology Center, Charlottesville, Va.
GEODETIC INSTRUMENT EXHIBIT
L. S. Khrenov 7 Dec. 1973 11 p Transl. into ENGLISH from Geod. i Kartografiya (USSR), no. 11, 1971 p 74-80
(AD-776567; FSTC-HT-23-1832-72) Avail: NTIS CSCL 08/5

The Geodesy-Geophysics-71 exhibition, part of the XV General Assembly of the IUGG in Moscow, featured geodetic instruments and devices from the U.S.S.R., the German Democratic Republic, the Federal Republic of Germany, Sweden, Switzerland, France and England. They included theodolites, tacheometers, levels of various accuracies, range finder attachments, light- and radio-range finders, an electronic level, a photoelectric attachment, a microbarograph, gravimeters, and other surveying instruments, some of new design. Author (GRA)

N74-27842# Physical Dynamics, Inc., Berkeley, Calif.
ENERGY SPECTRA OF THE OCEAN SURFACE. 2: INTERACTION WITH SURFACE CURRENT Semiannual Technical Report
Kenneth M. Watson, Bruce J. West, and Bruce I. Cohen Oct. 1973 67 p refs
(Contract F30602-72-C-0494; ARPA Order 1649)
(AD-775735; PD-73-037; RADC-TR-74-15) Avail: NTIS CSCL 08/3

The linear interaction equations between surface gravity waves and a surface current is reviewed. These equations are cast in the form of coupled eigenmode equations which are first order in time and can be solved numerically. The solutions to these coupled equations provide one with a view as to how a specified spectrum of surface waves is modified by a surface current. This analysis extends that in RADC-TR-73-74 (PD-72-030). It is found that the interaction regimes of tank experiments and ocean experiments can be quite different so that information obtained from the former does not necessarily provide information about the latter. Author (GRA)

N74-27843# Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
ANALYSIS OF MAJOR RIVER SYSTEMS AND THEIR DELTAS: MORPHOLOGIC AND PROCESS COMPARISONS
Lynn D. Wright, James M. Coleman, and Mary W. Erickson Jan. 1974 125 p refs
(Contract N00014-69-A-0211-0003; NR Proj. 388-002)
(AD-776258; TR-156) Avail: NTIS CSCL 08/7

Thirty-four major river systems were compared in terms of the morphology and process environments of their drainage basins, alluvial valleys, receiving basins, and delta plains. Data for a multitude of variables, were generated and compiled for each of the 34 systems. These data were stored in a systematic hierarchical arrangement in a comprehensive information-storage-and-retrieval computer system. For purposes of comparisons between river and delta systems, optimum combinations of salinent variables were selected and were subjected to multivariate statistical procedures, including factor analysis, cluster analysis, and discriminant analysis. The procedures established the existence of some discrete groups of river systems and facilitated quantitative assessment of the degrees of mutual similarity or dissimilarity between individual river systems and between groups of two or more systems. (Modified author abstract) GRA

N74-27844# Naval Oceanographic Office, Washington, D.C.
ANALYSIS OF DEFLECTION OF THE VERTICAL INNER ZONE METHODS
Angelo L. Kontis, Rudolph R. Michlik, and Thomas M. Davis Feb. 1974 86 p refs
(AD-776225; NOO-SP-260) Avail: NTIS CSCL 08/5

In the Vening Meinesz method of computing deflection of the vertical, the effect of the region surrounding the computation point (termed the inner zone) is usually determined by some special algorithm. A new method based on the representation of gravity anomalies by a sequence of discrete bicubic surfaces and the integration of these surfaces by the flat-earth approximation is given and compared with three existing inner-zone techniques. These techniques, designed for mean-anomaly cells in the shape of trapezoids are (1) two applications of Fischer's method termed Fischer IZN1 for an inner zone with area of about 4 sq nm, and Fischer IZN2 for an inner-zone with area of about 16 sq nm (2) the standard method, in which the inner-zone cells are treated by the Vening Meinesz formula and (3) the rim method in which the deflection effect of the cells surrounding the inner zone is multiplied by a constant. (Modified author abstract) GRA

N74-27845# Defense Mapping Agency Aerospace Center, St. Louis, Mo. Technical Translation Branch.
SOME STRUCTURAL FEATURES OF THE ANTARCTIC OCEAN AND ANTARCTICA ON THE BASIS OF GRAVIMETRIC DATA
Yu. Ya. Vashchilov and P. A. Stroev Jan. 1974 24 p refs Transl. into ENGLISH from Antarktika (USSR), no. 11, 1972 p 73-83
(AD-775876; DMAAC-TC-1993) Avail: NTIS CSCL 08/7

The gravity field of Antarctica has been studied very little, but the gravity field of the Antarctic Ocean has been studied even less. Japanese specialists performed gravimetric investigations in the sector between Australia, New Zealand and Antarctica. The main part of the gravity measurements fall in the Indian sector of the Anarctic Ocean; only single profiles and points, and some observations on some islands are available in the Pacific and Atlantic sectors. Latitudes in the forties and fifties are the most poorly studied because of continuous storms. The coastal waters of Antarctica are studied much better. Gravimetric points to encircle Antarctica with an almost closed ring in a band from 60 degrees to the coast of the continent and make it possible to describe the nature of the gravity field in these regions. GRA

N74-27846# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
MULTIFREQUENCY, LONG, VERTICAL SOUNDING OF THE LOWER IONOSPHERE Environmental Research Papers
B. W. Reinisch and G. S. Sales 20 Dec. 1973 13 p refs
(AF Proj. 5631)
(AD-778087; AFCRL-TR-74-0002; AFCRL-ERP-460) Avail: NTIS CSCL 04/1

Vertical pulse sounding at 30, 60, 180, and 520 kHz at Quabbin Reservoir, MA, USA, reveals diurnal and seasonal variations in structure, reflectivity, and height of the lower

ionosphere. A solid state wideband amplifier feeds 10 kW peak power into a ground-laid six-element antenna. A special digital sampling and integration scheme selects median values of amplitude and phase received at perpendicular loop antennas. Day and nighttime D-region model profiles are fitted to the observed data by matching group height and reflection coefficient. Emphasis is placed on the nighttime residual E-layer observed at 100 km with an electron density, under undisturbed conditions, around 1000/cc. Long and short term variability of this layer is considerable. It is often semi-transparent as indicated by simultaneous E- and F-region echoes, suggesting the presence of a valley above the nighttime E-layer. Author (GRA)

N74-27847# New Hampshire Univ., Durham. Dept. of Physics.
ANALYSIS OF ELECTRON DATA FROM THE OV1-13 SATELLITE Final Report, 1 Jul. 1972 - 31 Dec. 1973
David L. Klumpar, William R. Webber, and John A. Lockwood 25 Jan. 1974 22 p refs
(Contract F19628-73-C-0009; AF Proj. 8600)
(AD-777870; AFCRL-TR-74-0136) Avail: NTIS CSCL 04/1

Some gross features in the radiation belts have been investigated with the e-MA electron detector (nominal energy range 0.1 MeV to 1.0 MeV) on the OV1-13. More detailed and comprehensive studies cannot be made because there is too little data coverage. Temporal variations were observed in the spectral shape and intensity as a function of L during the June 10, 1968, geomagnetic storm. Comparisons were made of the particle populations measured by the OV1-13 e-MA detector and by the ATS-1 experiment (50-E-500 keV) during the substorm on April 10, 1968, and some later periods near June, 1968.
Author (GRA)

N74-27848# Arizona Univ., Tucson. Office of Arid Lands Studies.
WORLD DESERTIFICATION: CAUSE AND EFFECT, A LITERATURE REVIEW AND ANNOTATED BIBLIOGRAPHY
Wade C. Sherbrooke and Patricia Paylore 1973 176 p
(Contract DI-14-31-0001-3729)
(PB-228100/4; OWRR-W-141(3729)(3)) Avail: NTIS HC $5.50 CSCL 08F

An annotated bibliography is presented of 252 references, computer-produced from the University of Arizona's Arid Lands Information System (ALIS), with accompanying text that reviews briefly both cause and effect of world desertification. Causes fall into two categories: long-term (in the geologic sense) climatic change as supported by meteorological, archaeological, gemorphological, vegetational, palynological, and dendrochronological evidence in the literature; and those activities of man's historic occupance of arid and semiarid regions that have contributed to degeneration of marginal lands: agricultural and irrigation practices, grazing, fire, nomadism, and sand stablization and reforestation. Beyond these two categories, there is a third; climatic fluctuation--short-term weather patterns induced by uncertain rainfall and followed by cyclic droughts from which marginal areas may not recover is subjected to continued attempts at intensive use that cannot be sustained by a dry year or a succession of dry years. GRA

N74-27849# Earth Satellite Corp., Washington, D.C.
THE ERS SATELLITE COST BENEFIT STUDY Quarterly Progress Report, Aug. - Oct. 1973
16 Nov. 1973 42 p refs
(Contract DI-14-08-0001-13519)
(PB-226777/1; USGS-DO-74-001; QPR-3) Avail: NTIS HC $4.25 CSCL 08F

A study on agricultural crop acreage estimation was completed. Others on water resources: streamflow forecasting with improved snow area measurement: rangeland management; and land use planning and environmental management are in progress. Case study candidates are being evaluated in areas of: forest inventory and monitoring: expansion of agricultural production; marine resource management; environmental monitoring; and disaster monitoring and control. GRA

N74-27850# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
TROPICAL SOIL MOISTURE ESTIMATION FROM METEOROLOGICAL OBSERVATIONS
Iver A. Lund and Stanley M. Needleman 4 Feb. 1974 27 p refs
(AF Proj. 8624)
(AD-778099; AFCRL-TR-74-0064; AFCRL-ERP-465) Avail: NTIS CSCL 08/13

A climatology of soil moisture in the 6- to 12-in. layer beneath the surface of the earth is required for estimating the probability of favorable trafficability conditions. Insufficient measurements are available to prepare such a climatology. Therefore, this study was undertaken to determine the feasibility of estimating soil moisture from long records of meteorological observations, and then using the estimates to obtain the desired climatology. It was found that the meteorological observations contained insufficient information to accurately estimate day-to-day changes in soil moisture. However, they contained sufficient information to delineate the dry and wet seasons and to identify the periods and rates of transition from one season to the other. (Modified author abstract) GRA

N74-27851# Tri-Con Associates, Inc., Cambridge, Mass.
THE DESIGN, DEVELOPMENT AND TEST OF A ROCKET PAYLOAD TO MEASURE ATMOSPHERIC DENSITY Final Report, 8 Feb. 1972 - 15 Nov. 1973
William B. Huber Jan. 1974 62 p
(Contract F19628-72-C-0234; AF Proj. 6690)
(AD-777907; C-113) Avail: NTIS CSCL 04/1

Rocket-borne instrumentation to measure atmospheric density in the 100 km to 200 km altitude region was designed, developed, and fabricated. The instrumentation employed two pulsed 4.5 keV electron beams each with an average current of one milliampere. Observation of the beam induced bremsstrahlung was made with two end-window proportional counters and associated electronics in the 1.0 to 4.5 kev X-ray region. The ultraviolet fluorescence was observed with a single 3914 A photometer and associated logarithmic electrometer. In order to measure vehicle charge, a planar retarding potential analyzer was employed. This report details the sensor specifications and electrical design of the instrument payload. (Modified author abstract) GRA

N74-27852# Army Cold Regions Research and Engineering Lab., Hanover, N.H.
AIRBORNE RESISTIVITY SURVEY NEAR FAIRBANKS, ALASKA: AN AID IN BEDROCK GEOLOGY RECONNAISSANCE
Paul V. Sellmann, Pieter Hoekstra, and Allan J. Delaney Mar. 1974 21 p refs
(DA Proj. 4A1-62121-A-894)
(AD-777792; CRREL-SR-202) Avail: NTIS CSCL 08/7

An airborne electrical resistivity survey was flown near Fairbanks, Alaska. One of the objectives of the survey was to evaluate the potential of airborne VLF resistivity mapping to distinguish between rock types. The impetus for the study was the requirement by the U.S. Army Engineer District, Alaska, for a rock quarry in connection with the Chena River Lakes Project. The general area is near the southern limit of the rolling Yukon-Tanana Uplands. The bedrock consists of both the common Birch Creek schist and local intrusive igneous rocks. (Modified author abstract) GRA

N74-27853# Defense Mapping Agency Aerospace Center, St. Louis, Mo. Technical Translation Branch.
DETERMINATION OF DENSITY PROFILE PARAMETERS: ONE OF THE STAGES OF AN AUTOMATED SYSTEM FOR GRAVITY
E. G. Bulakh Apr. 1974 12 p refs Transl. into ENGLISH from Geofys. SB. (USSR), no. 50, 1972 p 46-49
(AD-778291; DMAAC-TC-2014) Avail: NTIS CSCL 08/5

The article deals with the description of one stage of an automated system for interpretation of gravity anomalies. Its application in practice is illustrated by an example.
Author (GRA)

N74-27854# Nielsen Engineering and Research, Inc., Mountain View, Calif.
APPLICATION OF BOUNDARY-LAYER THEORY TO DISPERSION IN NONSTRATIFIED TWO DIMENSIONAL ESTUARIES

Jack N. Nielsen and Gray D. Kuhn 1973 122 p refs
(Contract DI-14-31-0001-3698)
(PB-228852/0; NEAR-TR-45) Avail: NTIS HC $9.25 CSCL 08C

An analytical formula representing the law of the wall and the law of the wake of turbulent boundary-layer theory was found to represent the vertical velocity profiles of both laboratory channels and field data from real estuaries. The formula is used in an integral boundary layer calculation method to calculate the detailed time dependent flow field of two dimensional estuaries. For given tidal information, only the integrated continuity and momentum equations are necessary to calculate the two parameters of the formula. An analytical expression for the concentration profile is derived based on an analogy between turbulent exchange of momentum and mass. Good comparisons between theory and experiment were obtained for the flow field of a laboratory flume. GRA

N74-27855# Aerospace Corp., El Segundo, Calif.
CONJUGATE MAGNETOSPHERIC TRANSMISSIONS AT VLF FROM ALASKA TO NEW ZEALAND Technical Report, Jul. 1972 - Aug. 1973
Donald A. McPherson, Harry C. Koons, Mitchell H. Dazey, R. L. Dowden, and L. E. S. Amon 15 Apr. 1974 20 p refs
(Contract F04701-73-C-0074)
(AD-777812; TR-0074(9260-09)-7; SAMSO-TR-74-90) Avail: NTIS CSCL 04/1

A very-low-frequency (VLF) magnetospheric transmission experiment was conducted between Port Heiden, Alaska and Dunedin, New Zealand during August, 1972. Port Heiden is on an L-shell of 2.9 and is located 174-km geomagnetic north and 110-km geomagnetic east of the conjugate point for Dunedin. Whistler signals generated by the transmitter were detected at Dunedin for frequencies 6.8 and 21 kHz. The data show: strong fluctuations in whistler amplitude over time periods of seconds, a relatively even distribution of amplitudes over a 10 db range, and a weak dependence of amplitude on pulse length with the maximum intensity occurring for 0.2 to 0.4 sec pulse length. These characteristics are consistent with the concept that the waves are amplified by means of the Doppler shifted cyclotron resonance with energetic electrons. Author (GRA)

N74-27856# Fraunhofer-Gesellschaft, Garmisch-Partenkirchen (West Germany).
ATMOSPHERIC AEROSOLS BETWEEN 700 AND 3000 m ABOVE SEA LEVEL. PART 7: NEW FACILITIES Final Technical Report
Reinhold Reiter, Walter Carnuth, Hans Joachim Kanter, and Rudolf Sladkovic Dec. 1973 113 p refs
(Contract DAJA37-72-C-4115; DA Proj. 1T0-61102-B-53A)
(AD-778208) Avail: NTIS CSCL 04/1

A completely new basis was created for research work in the field of controlling the vertical aerosol structure by meteorological parameters. Work within the reporting period was mainly concerned with installation of old and new facilities in the new building, as well as their commissioning, testing and initial operation. The present report describes facilities and presents and discusses initial measuring examples. (Modified author abstract) GRA

N74-27857# Defense Mapping Agency Aerospace Center, St. Louis, Mo.
BOUGUER GRAVITY ANOMALY MAP OF SOUTH AMERICA
Gerald L. Breville, Charles W. Beierle, Joseph R. Sanders, James T. Voss, and Luman E. Wilcox Dec. 1973 37 p refs Presented at the 43rd Ann. Intern. Meeting of the Soc. of Exploration Geophys., Mexico City, 25 Oct. 1973
(AD-777090; DMAAC-TP-73-2) Avail: NTIS CSCL 08/5

The Bouguer Anomaly Map of South America is a contoured representation of one degree by one degree mean Bouguer gravity anomaly values. Some of these mean anomaly values are computed directly using observed gravity data held by the DOD Gravity Library. Other means are predicted values involving the application of geophysical-gravity correlated techniques. These geophysical prediction methods are discussed in relation to selected geological and tectonic provinces of South America. The map itself was prepared exclusively by automated map compilation techniques. Author (GRA)

N74-27858# Defense Mapping Agency Aerospace Center, St. Louis, Mo.
A BOUGUER GRAVITY ANOMALY MAP OF AFRICA
Rolf L. Slettene, Luman E. Wilcox, Ronald S. Blouse, and Joseph R. Sanders Dec. 1973 30 p refs Presented at the 54th Ann. Meeting of the Am. Geophys. Union, Washington, D. C., 19 Apr. 1973
(AD-777089; DMAAC-TP-73-3) Avail: NTIS CSCL 08/5

A Bouguer Gravity Anomaly Map of Africa has been compiled using only terrestrial data. The map is a contoured representation of one degree by one degree mean anomaly values. Some one degree by one degree values are computed by conventional or statistical means directly from observed gravity data held at DMAAC in the DOD Gravity Library. The majority of the one degree by one degree values are predicted by geophysical-gravity correlation methods. The anomaly pattern shown on the map is discussed and evaluated with respect to regional and local tectonic and geologic patterns. The entire Bouguer anomaly map is computer generated and drawn by an electronic plotting device. Author (GRA)

N74-28293* Scientific Translation Service, Santa Barbara, Calif.
STATISTICAL ANALYSIS OF THE DAILY MEAN FLUCTUATIONS OF THE PARAMETERS FOR THE UPPER ATMOSPHERE OF THE EARTH
V. Ye. Chertoprud *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 96-133 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 p 68-93 (For availability see N74-28287 17-30)
CSCL 04A

N74-28294* Scientific Translation Service, Santa Barbara, Calif.
EVALUATION OF THE ACCURACY IN PREDICTING SHORT-PERIOD VARIATIONS OF THE ATMOSPHERIC DENSITY
M. I. Voyskovskiy, I. I. Volkov, N. I. Gryazev, B. V. Kugayenko, V. M. Sinitsyn, and P. Ye. Elyasberg *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 134-150 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 p 93-107 (For availability see N74-28287 17-30)
CSCL 04A

N74-28295* Scientific Translation Service, Santa Barbara, Calif.
SEMIANNUAL VARIATIONS OF THE ATMOSPHERIC DENSITY AT ALTITUDE OF 200-300 km
A. M. Alferov *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 151-169 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 p 107-119 (For availability see N74-28287 17-30)
CSCL 04A

N74-28297* Scientific Translation Service, Santa Barbara, Calif.
MODIFICATIONS OF JACCHIA'S STATIC DIFFUSION MODELS OF THE UPPER ATMOSPHERE
M. A. Degtyarev *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 187-200 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 p 131-139 (For availability see N74-28287 17-30)
CSCL 04A

N74-28394* Kanner (Leo) Associates, Redwood City, Calif.
CHARTING ENVIRONMENTAL POLLUTION
Erich Halpert, Flavis Bizo, and Zoltan Karacsonyi *In its* The 4th Natl. Conf. on Acoustics Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 192-197 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 253-258 (For availability see N74-28363 17-32)

14 INSTRUMENTATION AND PHOTOGRAPHY

Includes design, installation, and testing of instrumentation systems; gyroscopes; measuring instruments and gages; recorders; transducers; aerial photography; and telescopes and cameras.

N74-27859* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
HEAT FLOW CALORIMETER Patent
James C. Fletcher (N. Am. Rockwell Corp., Canoga Park, Calif.) and William V. Johnston, inventors (to NASA) (N. Am. Rockwell Corp., Canoga Park, Calif.) Issued 4 Jun. 1974 9 p Filed 16 Jun. 1972 Supersedes N72-27430 (10 - 18, p 2428) Sponsored by NASA
(NASA-Case-GSC-11434-1; US-Patent-3,813,937; US-Patent-Appl-SN-263498; US-Patent-Class-73-190R) Avail: US Patent Office CSCL 14B

Heat flow calorimeter devices are used to measure heat liberated from or absorbed by an object. This device is capable of measuring the thermal output of sealed nickel-cadmium batteries or cells during charge-discharge cycles. An elongated metal heat conducting rod is coupled between the calorimeter vessel and a heat sink, thus providing the only heat exchange path from the calorimeter vessel itself.
Official Gazette of the U.S. Patent Office

N74-27860* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPECIFIC WAVELENGTH COLORIMETER Patent
Carle C. Brawner (Beckman Instr., Inc., Fullerton, Calif.), Larry S. McDavid (Beckman Instr., Inc., Fullerton, Calif.), and John M. Walsh, inventors (to NASA) (Beckman Instr., Inc., Fullerton, Calif.) Issued 18 Jun. 1974 9 p Filed 13 Feb. 1973 Supersedes N73-18443 (11 - 09, p 1035) Sponsored by NASA
(NASA-Case-MSC-14081-1; US-Patent-3,817,627; US-Patent-Appl-SN-331760; US-Patent-Class-356-180; US-Patent-Class-356-246; US-Patent-Class-250-576) Avail: US Patent Office CSCL 14B

A self contained, specific wavelength, single beam colorimeter is described for direct spectrophotometric measurement of the concentration of a given solute in a test sample. An electrical circuit employing a photoconductive cell converts the optical output into a linear, directly readable meter output. The colorimeter is simple to operate and is adapted for use in zero gravity conditions. In a specific application, the colorimeter is designed to analyze the concentration of iodine in potable water carried aboard a space vehicle such as the 4B stage of Skylab.
Official Gazette of the U.S. Patent Office

N74-27861* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
STEADY STATE THERMAL RADIOMETERS Patent
Jack D. Loose, inventor (to NASA) Issued 25 Jun. 1974 6 p Filed 17 Nov. 1972 Supersedes N73-12455 (11 - 03, p 0301)
(NASA-Case-MFS-21108-1; US-Patent-3,819,419; US-Patent-Appl-SN-307728; US-Patent-Class-136-213; US-Patent-Class-136-230; US-Patent-Class-136-233) Avail: US Patent Office CSCL 14B

A radiometer is described operating in a vacuum under steady state conditions. The front element is an aluminum sheet painted on the outer side with black or other absorptive material of selected characteristics. A thermocouple is bonded to the inner side of the aluminum sheet. That is backed by highly insulative layers of glass fiber and crinkled, aluminized Mylar polyester. Those layers are backed with a sturdy, polyester sheet, and the entire lamination is laced together by nylon cords. The device is highly reliable in that it does not drift out of calibration, and is significantly inexpensive.
Official Gazette of the U.S. Patent Office

N74-27862* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
ELECTRIC FIELD MEASURING AND DISPLAY SYSTEM Patent
Ronald J. Wojtasinski and Donald D. Lovall, inventors (to NASA) Issued 25 Jun. 1974 5 p Filed 13 Sep. 1972 Supersedes N73-10461 (11 - 01, p 0056)
(NASA-Case-KSC-10731-1; US-Patent-3,820,095; US-Patent-Appl-SN-288847; US-Patent-Class-340-200; US-Patent-Class-73-170R; US-Patent-Class-340-182; US-Patent-Class-340-151; US-Patent-Class-324-72) Avail: US Patent Office CSCL 14B

An apparatus is described for monitoring the electric fields of cloud formations within a particular area. It utilizes capacitor plates that are alternately shielded from the clouds for generating an alternating signal corresponding to the intensity of the electric field of the clouds. A synchronizing signal is produced for controlling sampling of the alternating signal. Such samplings are fed through a filter and converted by an analogue to digital converter into digital form and subsequently fed to a transmitter for transmission to the control station for recording.
Official Gazette of the U.S. Patent Office

N74-27863 Utah State Univ., Logan.
A GAS LUBRICATED PRECISION PLATFORM FOR INTERFEROMETRIC MEASUREMENTS Ph.D. Thesis
Ralph Hugh Haycock 1973 125 p
Avail: Univ. Microfilms Order No. 74-13219

A gas lubricated slide was developed and used as the translating platform to constrain the motion of a movable wedge of a field-widened interferometer-spectrometer to within very precise limits. The deviation from a straight line path for the wedge is less than 1/5 of a wavelength at .6328 microns and the rotational stability within 1/10 arc sec. when translated 4.7 cm. The dynamic displacement of the slide normal to drive axis was specified at less than 3 inches when operating in a white noise vibration environment. A unique mechanical configuration was required to facilitate the hand lapping operation required to obtain one wavelength flatness for all slide surfaces and parallelism within 25 inches. The low friction, absence of stick-slip friction, and operation over temperature extremes of 70 F to -320 F were the primary reasons for selecting gas as the lubricant.
Dissert. Abstr.

N74-27864* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CONDUCTIVE ELASTOMERIC EXTENSOMETER Patent
Raymond L. Gause and C. G. Glenn, inventors (to NASA) Issued 28 Jun. 1974 4 p Filed 7 Nov. 1972 Supersedes N73-11405 (11 - 02, p 0173)
(NASA-Case-MFS-21049-1; US-Patent-3,820,529; US-Patent-Appl-SN-304430; US-Patent-Class-128-2S; US-Patent-Class-73-88.5R; US-Patent-Class-338-5; US-Patent-Class-338-114) Avail: US Patent Office CSCL 14B

An extensometer was used for measuring surface area changes of the human body caused by expansion and contraction of the body. A relatively thin and wide strain responsive conductive elastomeric band was adapted for application to a part of the body, such as around a limb or the trunk of the body. The elastomeric band is incorporated as a resistor in a balanced bridge circuit. Expansion or contraction of the portion of the body on which the elastomeric band is applied causes a change in the resistance of the band and a resultant imbalance of the bridge circuit. The output of the amplifier in volts is suitable for proving the desired reading through a recorder, oscilloscope or voltmeter.
Official Gazette of the U.S. Patent Office

N74-27865* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DEVICE FOR MEASURING TENSILE FORCES Patent
Walter T. Appleberry, inventor (to NASA) (McDonnell-Douglas Corp., Huntington Beach, Calif.) Issued 28 Jun. 1974 5 p Filed 21 May 1973 Supersedes N73-25467 (11 - 16, p 1912) Sponsored by NASA
(NASA-Case-MFS-21728-1; US-Patent-3,820,388; US-Patent-Appl-SN-361907; US-Patent-Class-73-141A) Avail: US Patent Office CSCL 14B

This device is characterized by an elongated body having predetermined elastic properties. An applied tensile force of any magnitude, within a given range, imparts to the body an elongation of a predetermined length. The magnitude of applied tensile force

is indicated as a function of the angular motion afforded the threaded sleeve mounted on the body.
Official Gazette of the U.S. Patent Office

N74-27866* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THREE MIRROR GLANCING INCIDENCE SYSTEM FOR X-RAY TELESCOPE Patent
Richard B. Hoover, inventor (to NASA) Issued 28 Jun. 1974 5 p Filed 15 Feb. 1972 Supersedes N72-20397 (10 - 11, p 1473)
(NASA-Case-MFS-21372-1; US-Patent-3,821,556; US-Patent-Appl-SN-226477; US-Patent-Class-250-505; US-Patent-Class-250-511) Avail: US Patent Office CSCL 14B

A telescope suitable for soft X-ray astronomical observations consists of a paraboloid section for receiving rays at a grazing angle and a hyperboloid section which receives reflections from the paraboloid at a grazing angle and directs them to a predetermined point of focus. A second hyperboloid section is centrally located from the other two surfaces and positioned to reflect from its outer surface radiation which was not first reflected by the paraboloid. A shutter is included to assist in calibration.
Official Gazette of the U.S. Patent Office

N74-27867 Tennessee Univ., Knoxville.
A NEW ELECTRON SPECTROMETER DESIGN Ph.D. Thesis
John Daniel Allen, Jr. 1973 132 p
Avail: Univ. Microfilms Order No. 74-11227

A new design for a low energy electron analyzer suitable for use as a photoelectron spectrometer and characterized by great mechanical and operational simplicity is proposed. Two identical circular end plates of radius A, and an intervening negatively charged cylindrical reflecting electrode of radius A, and length C, define the analyzer's geometry. The end plates carry annular entrance and exit slits which communicate with the sample volume and electron detector respectively. The development of a computer raytrace program suited to the study of the analyzer is discussed. The program and the bulk of the data accumulated during an extended investigation of the analyzer are tabulated. A number of quantitative assessments of the analyzer's behavior are discussed together with some qualitative remarks concerning the very important focusing characteristics of the analyzer. Dissert. Abstr.

N74-27868*# Operations Research, Inc., Silver Spring, Md.
HANDBOOK FOR THE CALCULATION OF APPROXIMATE DATA FOR SPACEBORNE SENSORS
Aug. 1972 54 p
(Contract NAS5-21709)
(NASA-CR-130200) Avail: NTIS HC $5.75 CSCL 14B

In allocating the RF spectrum for the transmission of sensed data from space to earth, the characteristics of the data produced by each sensor are discussed. For example, data may be in the form of a continually varying voltage (analog) or may be a series of discrete pulses (digital). For the analog signal, its important characteristics to the spectrum allocator are its highest frequency component (bandwidth) and its range from minimum values (dynamic range or signal-to-noise ratio). For the digital signal, the characteristic of interest is the bit rate. Author

N74-27869*# Teledyne Brown Engineering, Huntsville, Ala.
DEVELOPMENT OF TECHNIQUES FOR ADVANCED OPTICAL CONTAMINATION MEASUREMENT WITH INTERNAL REFLECTION SPECTROSCOPY, PHASE 1, VOLUME 1 Final Report
J. D. Hayes Dec. 1972 179 p refs
(Contract NAS9-12571)
(NASA-CR-128715; SE-NASA-1674-Vol-1; MSC-14398-Vol-1) Avail: NTIS HC $12.00 CSCL 14B

The feasibility of monitoring volatile contaminants in a large space simulation chamber using techniques of internal reflection spectroscopy was demonstrated analytically and experimentally. The infrared spectral region was selected as the operational spectral range in order to provide unique identification of the contaminants along with sufficient sensitivity to detect trace contaminant concentrations. It was determined theoretically that a monolayer of the contaminants could be detected and identified using optimized experimental procedures. This ability was verified experimentally. Procedures were developed to correct the attenuated total reflectance spectra for thick sample distortion. However, by using two different element designs the need for such correction can be avoided. Author

N74-27870*# Techtran Corp., Glen Burnie, Md.
APPLICATION OF SPACE TECHNIQUES TO NATURAL RESOURCES STUDY AND ENVIRONMENTAL MONITORING: AN AIRCRAFT EXPERIMENT
Yu. K. Khodarev, G. A. Avanesov, B. S. Dunayev, Ya. L. Ziman, and Yu. M. Chesnokov Washington NASA Jun. 1974 10 p refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 4, Apr. 1974 p 25-29
(Contract NASw-2485)
(NASA-TT-F-15683) Avail: NTIS HC $4.00 CSCL 14B

Aircraft and space research designed to better identify ground objects from aerial photographic and spectral acquisition is described. Author

N74-27871# Kanner (Leo) Associates, Redwood City, Calif.
TEST OF ELECTROSTATIC PRECIPITATOR WITH TRANSVERSE GAS FLOW
V. N. Kazakov Nov. 1973 12 p refs Transl. into ENGLISH from Tsvetn. Metal. (Moscow), no. 3 p 48-52 Sponsored by EPA
(APTIC-32451; TR-155-74) Avail: NTIS HC $4.00

The design and function of an electrostatic precipitator is reviewed and the dust precipitation process in transverse gas flow (TGF) electrostatic precipitator is discussed. Tests to determine the cleaning efficiency of the TGF electrostatic precipitator were conducted using various dust compositions. Data confirming the cleaning efficiency of the apparatus are shown. A.A.D.

N74-27872*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
G-LOAD MEASURING AND INDICATOR APPARATUS Patent Application
James C. Howard, inventor (to NASA) Issued 12 Jun. 1974 22 p
(NASA-Case-ARC-10806; US-Patent-Appl-SN-478802) Avail: NTIS HC $4.25 CSCL 01D

A g-load measuring apparatus is described for facilitating pilot control of g-load during maneuvering and to provide an indication of g-load constraint violations. The apparatus includes processing means for receiving the components of the linear acceleration and angular velocity of the aircraft and for generating the first output signal indicative of the critical velocity of the aircraft and a second output signal indicative of the instantaneous maneuvering velocity of the aircraft. Indicating means is connected to the processing means for receiving the two output generated signals. NASA

N74-27873# Scientific Translation Service, Santa Barbara, Calif.
THE CLASSIFICATION CHARACTERISTICS OF THE PARTICLE DISTRIBUTION MEASUREMENT APPARATUS: ANDERSEN SAMPLER
Katsunori Honma 1974 4 p Transl. into ENGLISH of "Ryvdo Bunpu Sokuteiki Andersen Sampler No. Bunkyu Tokusei", paper presented at Jap. Ind. Hyg. Soc. 46th Ann. Meeting, Apr. 1973 Sponsored by EPA
(APTIC-50678; TR-147-74) Avail: NTIS HC $4.00

Experimental results of the comparison between the particle size distribution obtained by a direct gravimetric method by Anderson samplers, and the particle size distribution of the mass standard calculated by the electron microscope are presented. Standard aerosols with a small dispersion were measured. The particle size distributions obtained by both methods were approximated by a logarithmic normal distribution. It is shown that for large aerosol particles above submicron size, the particle size distribution curves coincide. Author

N74-27874*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A FILTER SPECTROMETER CONCEPT FOR FACSIMILE CAMERAS

Daniel J. Jobson, W. Lane Kelly, IV, and Stephen D. Wall
Washington May 1974 31 p refs
(NASA-TN-D-7560; L-9356) Avail: NTIS HC $3.25 CSCL 14E

A concept which utilizes interference filters and photodetector arrays to integrate spectrometry with the basic imagery function of a facsimile camera is described and analyzed. The analysis considers spectral resolution, instantaneous field of view, spectral range, and signal-to-noise ratio. Specific performance predictions for the Martian environment, the Viking facsimile camera design parameters, and a signal-to-noise ratio for each spectral band equal to or greater than 256 indicate the feasibility of obtaining a spectral resolution of 0.01 micrometers with an instantaneous field of view of about 0.1 deg in the 0.425 micrometers to 1.025 micrometers range using silicon photodetectors. A spectral resolution of 0.05 micrometers with an instantaneous field of view of about 0.6 deg in the 1.0 to 2.7 micrometers range using lead sulfide photodetectors is also feasible. Author

N74-27875*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MODULATED HYDROGEN ION FLAME DETECTOR Patent Application
John Dimeff, inventor (to NASA) Issued 28 Jun. 1974 10 p
(NASA-Case-ARC-10322-1; US-Patent-Appl-SN-484209) Avail: NTIS HC $4.00 CSCL 14B

In a hydrogen flame detector there is provided a means for modulating the density of a gas stream prior to its introduction into the detector flame. A detector, responsive to the resulting modulation of the flame, is provided for producing an output signal having a component fluctuating at the frequency of modulation. A cross-correlator, responsive to the output signal and a signal at the frequency of modulation, is provided for producing a resultant signal proportional to the cross-correlation between its two input signals. A means is further provided for recording or otherwise utilizing the resultant signal thus produced. NASA

N74-27876*# Perkin-Elmer Corp., Norwalk, Conn. Electro-Optical Div.
LST SECONDARY MIRROR ARTICULATION MECHANISM Final Report, 15 Sep. 1973 - 29 Mar. 1974
May 1974 98 p
(Contract NAS8-29723)
(NASA-CR-120237; Rept-11923) Avail: NTIS HC $8.00 CSCL 14B

The analysis, design, manufacture, test, and delivery of one secondary mirror articulation mechanism for the large space telescope (LST) are reported. The mechanism provides angular freedom about two axes that are perpendicular to the optical axis of the secondary mirror. Motion in each axis is controlled from two sources; one source provides alignment, the other source provides stabilization. Two articulation mechanism configurations were evaluated. In one configuration the stabilization system was assembled with piezoelectric actuators. In the second configuration the stabilization system utilized flexure torque motor actuators. The alignment system was the same for both configurations. System testing confirmed performance that met or exceeded all operational requirements. The two types of stabilization actuators had different performance characteristics. Both types demonstrated position resolution and frequency response better than specified limits. Author

N74-27877*# Washington Univ., St. Louis, Mo. Lab. for Space Physics.
APOLLO 17 LUNAR SURFACE COSMIC RAY DETECTOR Final Report
Robert M. Walker May 1974 108 p refs
(Contract NAS9-11895)
(NASA-CR-134329) Avail: NTIS HC $8.50 CSCL 14B

The objectives and selected data are presented for the Apollo 17 Lunar Surface Cosmic Ray Experiment (LSCRE) for the purpose of introducing an analysis of three of the separate detectors contained within in LSCRE package. The mica detector for measuring heavy solar wind, and the lexan stack and glass detectors for measuring energetic particles in space are discussed in terms of their deployment, exposure time, calibration, and data yield. Relevant articles on solar particles, interplanetary ions, and cosmic ray nuclei are also included. A.A.D.

N74-27878*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
GEOMETRICAL CORRECTION FACTORS FOR HEAT FLUX METERS
Kenneth J. Baumeister and S. Stephen Papell 1974 15 p refs Presented at the Thermophysics and Heat Transfer Conf., Boston, 15-17 Jul. 1974; sponsored by AIAA and ASME
(NASA-TM-X-71560; E-7526) Avail: NTIS HC $3.00 CSCL 14B

General formulas are derived for determining gage averaging errors of strip-type heat flux meters used in the measurement of one-dimensional heat flux distributions. The local averaging error e(x) is defined as the difference between the measured value of the heat flux and the local value which occurs at the center of the gage. In terms of e(x), a correction procedure is presented which allows a better estimate for the true value of the local heat flux. For many practical problems, it is possible to use relatively large gages to obtain acceptable heat flux measurements. Author

N74-27879*# TRW Systems Group, Redondo Beach, Calif.
STUDY TO EVALUATE THE INTEGRATION OF A MASS SPECTROMETER WITH A WET CHEMISTRY INSTRUMENT Final Report
31 Mar. 1974 164 p refs
(Contract NAS2-7685)
(NASA-CR-137517; TRW-24012-6001-RU-00) Avail: NTIS HC $11.25 CSCL 14B

The charactertistics and performance capability of the current Viking '75 Gas Chromatograph/Mass Spectrometer Instrument are reviewed and documented for the purpose of possible integration with a wet chemistry instrument. Interface, high mass discrimination, and vacuum requirements were determined in a simulated flight investigation. Suggestions for future investigations, tradeoff studies, and design modifications are presented, along with the results of column bleed measurements. A preliminary design of an integrated Wet Chemistry/Mass Spectrometer instrument for amino acid analysis is shown, including estimates of additional weight, volume, and power requirements. Author

N74-27880# Weapons Research Establishment, Salisbury (Australia).
A VACUUM ULTRACENTRIFUGE
M. S. Brown and G. F. R. C. Morris Oct. 1973 24 p refs
(WRE-TN-1040(AP)) Avail: NTIS HC $4.25

An ultracentrifuge used to magnetically support and spin small rotors to high rotational speeds was described. Electronic circuits for the magnetic support system and the rotor drive are given. The highest speed attained with the equipment was 17,500 rev/sec. Author

N74-27881# Defence Standards Labs., Maribyrnong (Australia).
HIGH SENSITIVITY EXTENSOMETER CALIBRATOR
G. E. W. Post and A. R. B. McNeill Sep. 1973 10 p refs
(Rept-570) Avail: NTIS HC $4.00

The multi-purpose instrument described includes a laser interferometer with digital readout and can calibrate extensometers at ambient temperatures over a range of 3 millimeters with an uncertainty of measurement of 0.03 micrometers or over a more typical range of 0.25 millimeters, with an uncertainty of 0.02 micrometers. Author

N74-27882# Defence Standards Labs., Maribyrnong (Australia).
CALIBRATION OF A FUSED QUARTZ PRECISION PRESSURE GAUGE
D. B. Prowse Dec. 1973 12 p refs
(Rept-578) Avail: NTIS HC $4.00

A method for the calibration of a precision vacuum gauge over the range 0-33 kPa (0-250 mmHg) was described. The accuracy of calibration was approximately 1 in 10,000 over most of the range. Author

N74-27883# Joint Publications Research Service, Arlington, Va.
INERTIAL INSTRUMENTS

6 Jun. 1974 35 p refs Transl. into ENGLISH from Priborostroyeniye, (Leningrad), no. 8, 1973, no. 2, 1974
(JPRS-62187) Avail: NTIS HC $4.75

The dynamic motions of gyroscopes, gyrostabilizers, and inertial ship navigation meters are analyzed. For individual titles, see N74-27884 through N74-27888.

N74-27884 Joint Publications Research Service, Arlington, Va.
INFLUENCE OF THE TORQUE OF A GYROMOTOR ON THE DYNAMICS OF A GYROSCOPE
V. A. Pavlov *In its* Inertial Instruments (JPRS-62187) 6 Jun. 1974 p 1-6 refs Transl. into ENGLISH from Priborostroyeniye, (Leningrad), no. 8, 1973 p 65-68 (For availability see N74-27883 17-14)

The conditions in which the torque of a gyromotor has an effect on the motion of a gyroscope around the axes of its suspension are investigated. Author

N74-27885 Joint Publications Research Service, Arlington, Va.
ERRORS OF THE EXTREMUM METHOD OF FINDING THE MERIDIAN DURING THE INITIAL ALIGNMENT OF INERTIAL SYSTEMS c21
E. I. Sliv, Yu. A. Borisov, Z. G. Zost, and A. D. Ilicheva *In its* Inertial Instruments (JPRS-62187) 6 Jun. 1974 p 7-12 refs Transl. into ENGLISH from Priborostroyeniye, (Leningrad), no. 8, 1973 p 68-71 (For availability see N74-27883 17-14)

The errors associated with the determination of the position of a gyro platform in azimuth according to the extremum of the azimuthal characteristics are considered. It is demonstrated that the accuracy of the determination of the position of the gyro platform expected in the first approximation is higher than in gyro compass studies. Author

N74-27886 Joint Publications Research Service, Arlington, Va.
COMPUTING POWER CHARACTERISTICS OF THE OUTER SPHERICAL SUSPENSION OF A CRYOGENIC GYROSCOPE
Yu. M. Urman *In its* Inertial instrumentats (JPRS-62187) 6 Jun. 1974 p 13-17 refs Transl. into ENGLISH from Priborostroyeniye, (Leningrad), no. 8, 1973 p 72-74 (For availability see N74-27883 17-14)
Avail: NTIS

A calculation of the forces and rigidities of the suspension of a cryogenic gyroscope is given in a case when the magnetic field of the system of the suspension is arbitrary in nature. The methodology of the calculation simplifies the formulas for the forces and rigidities and makes it possible to generalize the problem for a case of bodies with an arbitrary magnetic permeability. Author

N74-27887 Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF THE OPTIMUM DYNAMIC CHARACTERISTICS OF AN INERTIAL METER FOR MEASURING THE ALTERNATING MOTION OF A SHIP
L. P. Nesenyuk and I. B. Chelpanov *In its* Inertial Instrumentats (JPRS-62187) 6 Jun. 1974 p 18-25 refs Transl. into ENGLISH from Priborostroyeniye, (Leningrad), no. 2, 1974 p 65-70 (For availability see N74-27883 17-14)

The synthesis of optimum dynamic characteristics of an inertial meter for measuring the horizontal components of the acceleration, velocity, and motion of a ship is solved. The random drift of the gyroscope, the instrumental errors of the accelerometer, and also the motion of the ship caused by rolling, yawing, and the drift of a ship due to currents are considered. Author

N74-27888 Joint Publications Research Service, Arlington, Va.
STUDY OF THE MOTION OF A GYROSTABILIZER DURING UNIFORM ROTATION OF A BASE
V. B. Vedenin *In its* Inertial Instruments (JPRS-62187) 6 Jun. 1974 p 26-34 Transl. into ENGLISH from Priborostroyeniye, (Leningrad), no. 2, 1974 p 70-75 (For availability see N74-27883 17-14)

The equations of motion of a three axis gyrostabilizer in the presence of large angles of deviation of the platform are investigated. The dependences determining the drift and amplitude of the oscillations of the platform are obtained. Author

N74-27889*# Andros, Inc., Berkeley, Calif.
DEVELOPMENT OF TRACE GAS DETECTION INSTRUMENTATION
Apr. 1973 99 p
(Contract NAS2-6358)
(NASA-CR-137514; ARFR-24) Avail: NTIS HC $8.00 CSCL 14B

Breadboard hardware was constructed to demonstrate detection of a gaseous species by the heterodyne principle. The characteristics of the component parts were investigated and preliminay measurements were made to establish the sensitivity and selectivity of the method for gas analysis of CO, CO2, and N2O. A prototype heterodyne gas analyzer was designed, built, and brought into operational condition. Performance parameters of the prototype analyzer were investigated and its sensitivity to CO2 measured. Further development was undertaken for both the optical bench and the electronic processor components. A three-gas prototype analyzer, capable of measuring the gases CO, CO2, and CH4 was also constructed and tested. Detailed descriptions of the work and results are presented. Author

N74-27890# Battelle-Northwest, Richland, Wash. Radiological Sciences Dept.
DETECTION SYSTEMS FOR THE LOW-LEVEL RADIOCHEMICAL ANALYSIS OF IODINE-131, IODINE-129, AND NATURAL IODINE IN ENVIRONMENTAL SAMPLES
F. P. Brauer and J. H. Kaye 26 Oct. 1973 26 p refs Presented at Nucl. Sci. Symp., San Francisco, 14 Nov. 1973
(Contract AT(45-1)-1830)
(BNWL-SA-4726; Conf-731112-22) Avail: NTIS HC $3.50

A procedure based on chemical separation techniques and activation analysis was developed for the sequential analysis of low levels of I-131, I-129, and natural iodine in environmental samples. The iodine is first separated from the samples by oxidation. The separated iodine is then counted by low-level, beta-gated gamma spectrometry for the measuement of I-131. The chemical yield for the separation is measured by means of I-125 tracer. Activation analysis is used for measurement of the separated natural iodine (I-127) and I-129. The natural iodine is estimated from either the I-126 or I-128 activity produced in the sample; the induced I-130 is used to estimate the I-129 concentration. The measurement of I-130 at low levels requires specialized counting methods. Author (NSA)

N74-27891# Atomic Energy Commission, Oak Ridge, Tenn. Technical Information Center.
RADIOMETRIC GAGES: A BIBLIOGRAPHY
W. Hugh Kinser, comp. Jan. 1974 125 p refs
(TID-3338) Avail: NTIS HC $5.45

Approximately 794 references to reports and published literature on the design, operation, and uses of radiometric gages in industry, hydrology, civil engineering, and in the laboratory are presented. Abstracts of the papers are presented; and corporate author, report number, personal author, and subject indexes are included. NSA

N74-27892# Rockwell International Corp., Thousand Oaks, Calif.
COMPUTER CONTROL OF ELECTRON SPIN RESONANCE SPECTROSCOPY Technical Report, 1 Apr. 1973 - 28 Feb. 1974
Ira B. Goldberg, Harry R. Crowe, and Richard S. Carpenter, II Apr. 1974 32 p refs
(Contract N00014-73-C-0325; NR Proj. 051-553)
(AD-777117; SC549.3AR(P); TR-1) Avail: NTIS CSCL 14/2

A laboratory computer interface with an electron spin resonance (ESR) spectrometer is reported, which permits operator control of the magnetic field through the computer. Two programs are described. In the first, the field is stepped and checked for stability at pre-set increments before data from a signal channel and a reference channel are collected. Any number of increments can be accumulated, and the signal channel can also be recorded as a function of time. The second program uses a continuous sweep to collect data. Sweep rates up to 10 KG/min have been used. No auxiliary coils are used. The data acquisition program is started by signal from the reference channel, and the reference absorptions are counted on the return sweep to insure reproducible starting fields. Signals from the reference or from the sample channels can be recorded during a sweep.

Both programs are sufficiently open so that other peripheral functions can be executed. Author (GRA)

N74-27893# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
A DOPPLER SHIFT INTERFEROMETRIC TECHNIQUE FOR MEASURING SMALL ABSORPTION COEFFICIENTS Instrumentation Papers
Lyn H. Skolnik, Alfred Kahan, Audun Hordvik, and Martin Clark 20 Dec. 1973 31 p refs
(ILIR Proj. 2H-01)
(AD-778077; AFCRL-TR-74-0001; AFCRL-IP-210) Avail: NTIS CSCL 20/6

An automated laser Doppler interferometer is used to measure low absorption coefficients in infrared transmitting materials. The Hewlett-Packard interferometer employs a He-Ne laser whose lasing level is Zeeman split by an axial magnetic field into two frequencies. Half of the interferometer beam is optically self-heterodyned to supply a local oscillator frequency while the other half of the beam is frequency separated by polarization filters. One frequency is isolated and the other is transmitted through the infrared test window and returned. When the test material is irradiated by a CO2 laser, the transmitted He-Ne beam undergoes a Doppler shift due to thermally induced changes in optical path through the window. The resulting Doppler shift is detected by optically heterodyning the transmitted beam with the isolated portion and subtracting the local oscillator frequency. The shift is thus used to remotely monitor rate of thermal rise in the window sample and thereby to measure the optical absorption coefficient. This technique is compared to standard adiabatic calorimetry with a view toward eliminating many experimental difficulties inherent in the latter method.
Author (GRA)

N74-27894# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
NOVEL ACOUSTIC AND MAGNETIC ROTATION RATE SENSORS Instrumentation Papers
Ronald G. Newburgh, Philipp Blacksmith, Alan J. Budreau, and James C. Sethares 10 Jan. 1974 24 p refs
(AF Proj. 5635)
(AD-778084; AFCRL-TR-74-0023; AFCRL-IP-213) Avail: NTIS CSCL 17/1

The similarities and differences between acoustic and magnetic surface waves as compared with light waves are discussed. This comparison suggests several advantages of surface wave ring interferometers over optical ring interferometers for rotation sensing. The primary advantages are increased sensitivity, ease of construction, and size reduction. Proposed designs for such sensors are given. In the appendixes the optical ring interferometer and ring laser are reviewed. Author (GRA)

N74-27895# Accumetrics Corp., Cambridge, Mass.
DEVELOPMENT OF AN IMPROVED SENSITIVE TRIAXIAL PIEZOELECTRIC ACCELEROMETER Final Report, 11 Feb. 1971 - 14 Dec. 1973
Donald H. Fryklund 3 Dec. 1973 28 p refs
(Contract F19628-71-C-0131; AF Proj. 6690)
(AD-778104; AC-186; AFCRL-TR-74-0123) Avail: NTIS CSCL 04/1

The triaxial piezoelectric accelerometer has been subjected to certain modifications. To allow flights aboard sounding rockets without the requirement for de-spinning, the system frequency response has been broadened to allow operation at normal sounding rocket spin rates. The noise figure deterioration as a consequence of the increased band-pass has been partially compensated by taking advantage of recent improvements in semiconductor components, and by a new piezoelectric element design. A simple technique for computer-recovery of low frequency data has been devised. Minor changes in mechanical design have been made. Two flight quality accelerometer systems have been fabricated and tested, one of which was flight tested during the Ice Cap 73 rocket program. (Modified author abstract) GRA

N74-27896# California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
A DIGITAL OFFSET FLUXGATE MAGNETOMETER FOR USE IN REMOTE GEOMAGNETIC OBSERVATORIES
James J. Power 20 Sep. 1973 93 p refs
(Contract F19628-72-C-0175; AF Proj. 8601)
(AD-777885; IGPP-1247-37; SR-1; AFCRL-TR-73-0603) Avail: NTIS CSCL 17/6

The circuit design of a completely automatic fluxgate magnetometer is presented. The instrument is designed to measure the magnitude and direction of the local field vector at the observatory over a dynamic range of plus or minus 65,500 gamma with a resolution of 0.1 gamma. Design goals for the uncertainty in the zero offset of the sensor and noise level of the sensor are less than 1 gamma and 0.1 gamma peak to peak, respectively. The ring core fluxgate sensors are constructed using commercially available nickel alloy magnetic cones. The electronics of each axis contain two null feedback circuits. The fine feedback system with a dynamic range of plus or minus 64 gamma establishes the fundamental resolution and frequency response of the instrument. A digital offset feedback system maintains the ambient field along the sensor axis within the dynamic range of the fine system by automatic application of an appropriate number of discrete steps of 64 gamma. (Modified author abstract) GRA

N74-27897# IIT Research Inst., Chicago, Ill.
AN IMPROVED ELF ELECTRIC FIELD PROBE
Vincent C. Formanek Mar. 1974 60 p
(Contract N00039-73-C-0030)
(AD-777708; IITRI-E6249-2) Avail: NTIS CSCL 14/2

The design and development of an improved probe for measuring electric fields at extremely low frequencies is described. The probe is spherically shaped and relatively small (6.3 cm in diameter). It uses a fiber optic light guide as the transmission medium to prevent unnecessary disturbance of the measured electric field. The probe is capable of measuring fields between 10 mV/meter and 500 V/meter with a passband of 20 Hz to 12 kHz. Problems encountered in design, packaging, and field use and their solutions are presented. Author (GRA)

N74-27898# Franklin Inst. Research Labs., Philadelphia, Pa.
THE APPLICATIONS OF SOLID-STATE X-RAY DETECTORS IN DIFFRACTION TECHNIQUES Final Report, 1 Jul. 1972 - 31 Dec. 1973
Laurence Leonard 31 Jul. 1973 29 p refs
(Contract N00014-73-C-0018)
(AD-778034; FIRL-F-C3454) Avail: NTIS CSCL 14/2

A Si (li) solid state X-ray detector has been evaluated for its potential application in X-ray residual stress and retained austenite measurements. For fixed angle diffraction of low 2 theta values the inherent errors in determining peak positions coupled with the limited resolution of the detector made it impossible to achieve the degree of accuracy characteristic of the standard high 2 theta scanning technique for measuring residual stresses. However, there may be particular repetitive applications where the ability to measure stresses to plus or minus 10,000 psi in a few minutes time may warrant the use of the solid state detector. A technique was developed for measuring retained austenite by means of analyzing the intensities of four diffraction lines, two from austenite and two from martensite, recorded simultaneously at a fixed low 2 theta angle. For a standard specimen with 4% austenite the reproducibility was plus or minus 0.3% for counting times as low as 3-5 minutes. Since the solid state detector can also be used for fluorescent and structural analyses it can increase the versatility of a standard diffractometer. Author (GRA)

N74-27899# Utah State Univ., Logan. Electro-Dynamics Lab.
ROCKETBORNE NEAR INFRARED RADIOMETER SYSTEM. MODEL NR-1 Final Report, 1 Jul. 1970 - 31 Jan. 1974
Clair L. Wyatt 31 Jan. 1974 46 p refs
(Contract F19628-70-C-0280; AF Proj. 641A)
(AD-778105; AFCRL-TR-74-0059) Avail: NTIS CSCL 14/2

A nitrogen-cooled rocketborne radiometer design and system test evaluation are given. The instrument uses an indium antimonide photovoltaic detector with a 77K background. The entire optical subsection of the instrument, including detector, filter, chopper, and lens is cooled to near 77K. GRA

N74-28281* Kanner (Leo) Associates, Redwood City, Calif.
INSTRUMENTS FOR MEASURING RADIANT THERMAL FLUXES
O. A. Gerashenko and S. A. Sazhina *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 95-101 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 62-66 (For availability see N74-28272 17-30)
CSCL 14B

N74-28372* Kanner (Leo) Associates, Redwood City, Calif.
CONTRIBUTIONS TO THE PROBLEM OF PIEZOELECTRIC ACCELEROMETER CALIBRATION
I. Jakab and A. Bordas *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 55-61 refs Transl. into ENGLISH from A 4-A Conferinta Nationalade Acustica Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 81-86 (For availability see N74-28363 17-32)
CSCL 14B

N74-28373* Kanner (Leo) Associates, Redwood City, Calif.
VIBRATION AND NOISE MEASURING INSTRUMENTS BUILT IN THE RSR
Ioan Georgescu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 62-67 Transl. into ENGLISH from A 4-A. Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 89-95 (For availability see N74-28363 17-32)
CSCL 14B

N74-28374* Kanner (Leo) Associates, Redwood City, Calif.
PHOTOELECTRONIC VIBROMETER WITH POLARIZED LIGHT
I. Kremmer *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 68-72 refs Transl. into ENGLISH from A 4-A Conferintal Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulli Si Vibratiilor, Bucharest, 29-31 May 1973 p 97-101 (For availability see N74-28363 17-32)
CSCL 14B

N74-28395* Kanner (Leo) Associates, Redwood City, Calif.
AN OBJECTIVE METHOD AND MEASURING EQUIPMENT FOR NOISE CONTROL AND ACOUSTIC DIAGNOSTICS OF MOTORCARS
J. Kacprowski, J. Motylewski, and J. Miazga *In its* The 4th Natl. Conf. on Acoustics Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 198-204 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 261-268 (For availability see N74-28363 17-32)
CSCL 14B

N74-28399* Kanner (Leo) Associates, Redwood City, Calif.
USE OF CONVENTIONAL EQUIPMENT TO MEASURE THE EFFECTIVE PERCEIVED NOISE LEVEL OF AIRCRAFT
Nicholas Plom *In its* the 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 224-232 ref Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 293-298 (For availability see N74-28363 17-32)
CSCL 14B

15 MACHINE ELEMENTS AND PROCESSES

Includes bearings, seals, pumps, and other mechanical equipment; lubrication, friction, and wear; manufacturing processes and quality control; reliability; drafting; and materials fabrication, handling, and inspection.

N74-27900* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
APPARATUS FOR INSERTING AND REMOVING SPECIMENS FROM HIGH TEMPERATURE VACUUM FURNACES Patent
Charles W. Whitehead, inventor (to NASA) Issued 18 Jun. 1974 5 p Filed 17 Nov. 1972 Supersedes N73-12494 (11 - 05, p 0305)
(NASA-Case-LAR-10841-1; US-Patent-3,817,084; US-Patent-Appl-SN-307729; US-Patent-Class-73-15R; US-Patent-Class-13-31) Avail: US Patent Office CSCL 14B

The apparatus comprises a high speed gate valve for isolating the interior of the furnance from an air lock chamber on the opposite side of the gate valve. The air lock chamber is provided with valve ports connected to a vacuum source, a source of inert quenching gas, and the atmosphere, respectively. Attached to the end of the air lock chamber away from the furnace is a cylindrical tube having disposed within it a rod carrying specimen pan at the end towards the furnace and having mounted at its top end an annular magnet having a diameter slightly less than the interior diameter of the tube. The top end of the tube is closed by a removeable cap. Encircling the tube in the vicinity of the magnet is a carbon steel ring which when axially moved along the tube causes the magnet to follow it and thereby controls the position of the rod and specimen pan within the tube.
Official Gazette of the U.S. Patent Office

N74-27901* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CONCENTRIC DIFFERENTIAL GEARING ARRANGEMENT Patent
Robert J. Zeiger and John C. Gerdts, inventors (to NASA) Issued 25 Jun. 1974 5 p Filed 29 Nov. 1972 Supersedes N73-29459 (11 - 20, p 2423)
(NASA-Case-ARC-10462-1; US-Patent-3,818,775; US-Patent-Appl-SN-310615; US-Patent-Class-74-675; US-Patent-Class-74-710) Avail: US Patent Office CSCL 13I

Two input members and two concentric rotatable output members are interconnected by a planetary gear arrangement. The first input drives directly the first output. The second input engages a carrier having the planetary gears affixed thereto. Rotation of the carriage causes rotation of the central sun gear of the planetary gear system. The sun gear is journaled to the carriage and is drivingly connected to the second output through a direction reversing set of bevel gears. The first input drive member includes a ring gear drivingly connected to the planetary gears for driving the second output member in the same direction and by the same amount as the first output member. Motion of the first input results in equal motion of the two outputs while input motion of the second input results in movement of the second output relative to the first output. This device is useful where non-interacting two-axis control of remote gimbaled systems is required.
Official Gazette of the U.S. Patent Office

N74-27902* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AIR CONDITIONING SYSTEM AND COMPONENT THEREFOR DISTRIBUTING AIR FLOW FROM OPPOSITE DIRECTIONS Patent
Henry D. Obler and Hugh B. Bauer, inventors (to NASA) Issued 25 Jun. 1974 9 p Filed 28 Apr. 1972 Supersedes N72-28503 (10 - 19, p 2570)
(NASA-Case-GSC-11445-1; US-Patent-3,818,814; US-Patent-Appl-SN-248471; US-Patent-Class-98-39; US-Patent-Class-236-49) Avail: US Patent Office CSCL 13I

The air conditioning system comprises a plurality of separate air conditioning units coupled to a common supply duct such that air may be introduced into the supply duct in two opposite flow directions. A plurality of outlets such as registers or auxiliary or branch ducts communicate with the supply duct and valve means are disposed in the supply duct at at least some of the outlets for automatically channelling a controllable amount of air from the supply duct to the associated outlet regardless of the direction of air flow within the supply duct. The valve means comprises an automatic air volume control apparatus for distribution within the air supply duct into which air may be introduced from two opposite directions. The apparatus incorporates a freely swinging movable vane in the supply duct to automatically channel into the associated outlet only the deflected

air flow which has the higher relative pressure.
Official Gazette of the U.S. Patent Office

N74-27903* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
LATCH MECHANISM
Larry P. Ratcliff, inventor (to NASA) 28 Jun. 1974 9 p Filed 26 Oct. 1972 Supersedes N73-11443 (11 - 02, p 0178)
(NASA-Case-MSC-12549-1; US-Patent-3,820,741; US-Patent-Appl-SN-301039; US-Patent-Class-244-1SD) Avail: US Patent Office CSCL 13E

A latching mechanism is described which has a latch member which will collapse when a latching surface is passed over it and brought into a position to engage the latch member. It will return and automatically engage the latching surface as the latching surface passes completely by the latch member. The latch member is pivotally attached to a linking member which is pivotally mounted in a housing. This arrangement makes the release and disengagement of the latch member from the latching surface easier and more expedient than was possible with capture latches. The improved capture.
Official Gazette of the U.S. Patent Office

N74-27904* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MAGNETOCALORIC PUMP Patent
Gerald V. Brown, inventor (to NASA) Issued 25 Jun. 1974 4 p Filed 10 Nov. 1972 Supersedes N73-14479 (11 - 05, p 0551)
(NASA-Case-LEW-11672-1; US-Patent-3,819,299; US-Patent-Appl-SN-305639; US-Patent-Class-417-52) Avail: US Patent Office CSCL 13K

A vessel having inlet and outlet valves is disposed in a container with a fluid to be pumped which may be evolved from a liquid in the container below the vessel. A magnetocaloric substance is disposed in the vessel and causes fluid vapor in the vessel to expand and be expelled through the outlet valve. Vapor is drawn in through the inlet valve as the substance cools. The inlet valves may be one-way check valves or may be solenoid valves energized at appropriate times by timing circuits. A timer controlled heating element may also be disposed in the vessel to operate in conjunction with the magnetic field.
Official Gazette of the U.S. Patent Office

N74-27905* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
GRINDING ARRANGEMENT FOR BALL NOSE MILLING CUTTERS Patent
Charles F. Burch, inventor (to NASA) Issued 28 Jun. 1974 9 p Filed 14 Sep. 1972 Supersedes N73-10504 (11 - 01, p 0061)
(NASA-Case-LAR-10450-1; US-Patent-3,820,286; US-Patent-Appl-SN-289017; US-Patent-Class-51-97R; US-Patent-Class-51-225; US-Patent-Class-51-234) Avail: US Patent Office CSCL 13I

A grinding arrangement for spiral fluted ball nose end mills and like tools includes a tool holder for positioning the tool relative to a grinding wheel. The tool is mounted in a spindle within the tool holder for rotation about its centerline and the tool holder is pivotably mounted for angular movement about an axis which intersects that centerline. A follower arm of a cam follower secured to the spindle cooperates with a specially shaped cam to provide rotation of the tool during the angular movement of the tool holder during the grinding cycle, by an amount determined by the cam profile. In this way the surface of the cutting edge in contact with the grinding wheel is maintained at the same height on the grinding wheel throughout the angular movement of the tool holder during the grinding cycle.
Official Gazette of the U.S. Patent Office

N74-27906*# TRW Systems Group, Redondo Beach, Calif.
POLYIMIDE WELD BONDING FOR TITANIUM ALLOY JOINTS Final Report, 9 Jun. 1972 - 9 Feb. 1974
R. W. Vaughan and R. M. Kurland 9 Feb. 1974 72 p refs
(Contract NAS1-11689)
(NASA-CR-132434) Avail: NTIS HC $6.75 CSCL 13H

Two weld bonding processes were developed for joining titanium alloy; one process utilizes a weld-through technique and the other a capillary-flow technique. The adhesive used for the weld-through process is similar to the P4/A5F system. A new polyimide laminating resin, BFBI/BMPM, was used in the capillary-flow process. Static property information was generated for weld-bonded joints over the temperature range of 219 K (-65 F) to 561 K (+550 F) and fatigue strength information was generated at room temperature. Significant improvement in fatigue strength was demonstrated for weld-bonded joints over spot-welded joints. A demonstration was made of the applicability of the weld-through weld-bonding process for fabricating stringer stiffened skin panels.
Author

N74-27907# Joint Publications Research Service, Arlington, Va.
TRANSMISSION CONSISTING OF A ROLLED WIRE WORM AND A SPIRAL EVOLUTE GEAR
V. I. Rybakov 6 Jun. 1974 9 p refs Transl. into ENGLISH from Priborostr. (Leningrad), no. 8, 1973 p 75-80
(JPRS-62178) Avail: NTIS HC $4.00

Formulas were obtained for the determination of the geometrical dimensions of the elements of a transmission, and a methodology was developed for calculating the magnitudes of the oscillation of the momentary values of the gear ratio. The factors affecting the magnitude of this oscillation are analyzed.
Author

N74-27908*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EXPLOSIVE-ACTUATED VALVE DESIGN CONCEPT THAT ELIMINATES BLOW-BY
Ray Hagler, Jr. 1 May 1974 34 p refs
(Contract NAS7-100)
(NASA-CR-138769; JPL-TM-33-682) Avail: NTIS HC $4.75 CSCL 13K

A method of evaluating the normally open normally closed, explosive actuated valves that were selected for use in the trajectory correction propulsion subsystem of the Thermoelectric Outer Planet Spacecraft (TOPS) program is presented. The design philosophy which determined the requirements for highly reliable valves that could provide the performance capability during long duration (10 year) missions to the outer planets is discussed. The techniques that were used to fabricate the valves and manifold ten valves into an assembly with the capability of five propellant-flow initiation/isolation sequences are described. The test program, which was conducted to verify valve design requirements, is outlined and the more significant results are shown.
Author

N74-27909# Translation Consultants, Ltd., Arlington, Va.
PROBLEMS ASSOCIATED WITH WET DUST CLEANING OF GASES
E. Weber 1974 30 p refs Transl. into ENGLISH from Keram. Z. (Luebeck), v. 2, no. 8, 1969 p 484-489 Sponsored by EPA
(APTIC-22795; TR-179-74) Avail: NTIS HC $4.50

The basic principles and limitations of wet dust cleaning are presented along with an overview of the possible absorption values of dust particles by water droplets. Droplet size and dwell time of the droplets in the cleaning space are discussed, while the essential factor of efficiency in the process is identified as that condition where the optimum number of dust particles in the gas are brought in contact with the washing fluid. Methods for achieving the optimal condition are described, and mathematical computations for the collision encounter are given which take into account the cleaning parameter, dust extraction, condensation, particle mass, drop impact volume, and gas-dust velocities.
A.A.D.

N74-27910*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STUDY OF LUBRICANT JET FLOW PHENOMENA IN SPUR GEARS
L. S. Akin (GE), D. P. Townsend, and J. J. Mross (GE) 1974 27 p refs Proposed for presentation at lubrication Conf., Montreal, 8-10 Oct. 1974; sponsored by ASME and Am. Soc. of Lubrication Engr.
(NASA-TM-X-71572; E-8012) Avail: NTIS HC $3.25 CSCL 13I

Lubricant jet flow impingement and penetration depth into a gear tooth space were measured at 4920 and 2560 rpm using a 8.89 cm (3.5 inch) pitch diameter 8 pitch spur gear at

oil pressures from 70,000 to 410,000 n/sqm (10 psi to 60 psi). A high speed motion picture camera was used with xenon and high speed stroboscopic lights to slow down and stop the motion of the oil jet. An analytical model was developed for the vectorial impingement dept and for the impingement depth with tooth space windage effects included. The windage effects for oil drop size greater than .0076 cm (.003 inches). The analytical impingement dept compared favorably with experimental results above an oil jet pressure of 70,000 n/sqm (10psi). There was further penetration into the tooth space after impingement, but much of this oil was thrown out of the tooth space without further contacting the gear teeth. Author

N74-27911*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AN ASSESSMENT OF SEPARABLE FLUID CONNECTOR SYSTEM PARAMETERS TO PERFORM A CONNECTOR SYSTEM DESIGN OPTIMIZATION STUDY
Willibald Peter Prasthofer Jan. 1974 152 p refs
(NASA-TM-X-64849) Avail: NTIS HC $5.00 CSCL 13E

The key to optimization of design where there are a large number of variables, all of which may not be known precisely, lies in the mathematical tool of dynamic programming developed by Bellman. This methodology can lead to optimized solutions to the design of critical systems in a minimum amount of time, even when there are a great number of acceptable configurations to be considered. To demonstrate the usefulness of dynamic programming, an analytical method is developed for evaluating the relationship among existing numerous connector designs to find the optimum configuration. The data utilized in the study were generated from 900 flanges designed for six subsystems of the S-1B stage of the Saturn 1B space carrier vehicle. Author

N74-27912# Cranfield Inst. of Technology (England).
THE DESIGN AND DEVELOPMENT OF A MODULATED CURRENT WELDING POWER SOURCE
B. E. Pinfold, B. R. Moffitt, and T. E. Clifton Nov. 1973 35 p
(Cranfield-Mat-11) Avail: NTIS HC $4.75

The electrical design and fabrication of a transistorized current controller is described. The initial design philosophy is disucssed and complete details are given of the contruction and commissioning of a prototype unit. The development of a commercially viable unit using design data gained from the prototye is outlined and complete electrical circuits and constructional information provided. The commercially viable unit is capable of continuous highly stabilized or modulated current outputs. Author

N74-27913# Manlabs, Inc., Cambridge, Mass.
DEVELOPMENT OF HIGH STRENGTH TITANIUM DIBORIDE COMPOSITES FOR NON-SPARKLING TOOL APPLICATIONS
L. Kaufman and R. L. Pober 1 Sep. 1973 40 p refs
(Contract DI-BM-SO-122126)
(PB-226479/4; BM-OFR-1-74) Avail: NTIS HC $4.00 CSCL 13I

Fifteen boride composites were synthesized by hot pressing and evaluated by physical and incendivity testing as nonsparking tool materials. The incendivity tests compared the boride composites with standard cobalt-bonded tungsten carbide material used for coal cutter bits. Two titanium diboride composites and two zirconium diboride composites out-performed cobalt-bonded tungsten carbide in wear resistance and reduced tendency to cause ignitions. However, three of these candidates exhibited undesirable chipping. The remaining candidate, a TiB2-(Ni, Cu) composite, did not chip, nor did it cause ignitions at levels where cobalt-bonded tungsten carbide tools caused ignitions in the incendivity tests. Author (GRA)

N74-27914# British Steel Corp., Sheffield (England). Information Services.
THE CONTINUOUS CASTING OF STEEL: A SURVEY AND BIBLIOGRAPHY OF THE LITERATURE PUBLISHED DURING 1972
D. G. Brinn Dec. 1973 36 p refs
(PB-226973/6; SM/682/1) Avail: NTIS HC $5.00 CSCL 13H

The survey, the fourth in the annual series, reviews the published literature on the subject of continuous casting under nine headings: (1) World Trends, (2) New Contracts and Installations, (3) Productivity, Yields and Production Matching, (4) Design and Planning, (5) Plant Descriptions and Operations, (6) Steelmaking and Casting Practices, (7) Solidification and Withdrawal of Strands, (8) Processing of Continuously Cast Products, and (9) Quality of Product. In an appended bibliography some 200 references are noted. GRA

N74-27915# British Steel Corp., Sheffield (England). Information Services.
THE WELDING OF COR-TEN STEELS
C. Sheach and A. Clark Dec. 1973 12 p
(PB-226977/7; GS/PROD/MISC/59/73/C) Avail: NTIS HC $4.00 CSCL 13H

Recommendations are made for the welding and flame cutting of the Cor-Ten weathering steels. GRA

N74-27916# Virginia Polytechnic Inst. and State Univ., Blacksburg.
NONPARAMETRIC AND EXTERNAL STATISTICS IN EARLY FAILURE ANALYSIS WITH UNEQUAL SAMPLE SIZES Technical Report, Jul. - Sep. 1972
Agnes S. Heller and Robert A. Heller May 1973 34 p refs
(Contract F33615-72-C-2111; AF Proj. 7340)
(AD-777176; AFML-TR-73-42) Avail: NTIS CSCL 14/4

In the past, early failure analysis has been limited to either single samples or to samples of identical size. The technique is here extended to unequal size samples and its use is illustrated with the graphical and analytical determination of parent population parameters from first and second fatigue failure data. Author (GRA)

N74-27917# Naval Intelligence Support Center, Washington, D.C. Translation Div.
ASSEMBLY AND WELDING OF STAINLESS STEEL AND ALUMINUM STRUCTURES
N. T. Melnichenko 21 Jan. 1974 30 p refs Transl. into ENGLISH from the book "Montazh i Svarka Konstrukt. iz Nerzhaveiushchei Staili i Alumiya" Leningrad, 1968 p 6-10, 60-77
(AD-777414; NISC-Trans-3502) Avail: NTIS CSCL 13/8

Contents: Austenitic steels; Basic features of welding; Manual arc welding; Argon-shielded arc welding with nonconsumable (tungsten) electrode, field of application and specific features of this method; Gas-shielded-arc welding of stainless steels with consumable electrode; Submerged-arc welding of stainless steels. GRA

N74-27918# Pennsylvania State Univ., University Park. Dept. of Mineral Engineering.
EVALUATION OF MINE ELECTRICAL SYSTEMS WITH RESPECT TO SAFETY, TECHNOLOGY, ECONOMICS, AND LEGAL CONSIDERATIONS. VOLUME 1: TEXT, TABLES AND ANALYSES Final Report
Robert Stefanko, Lloyd A. Morley, and Atmesh K. Sinha 18 Jul. 1973 60 p refs
(Grant DI-BM-G0-1011729)
(PB-225476/1; BM-OFR-70(1)-73) Avail: NTIS HC $5.25 HC also available from NTIS $11.00/set of 2 reports as PB-225475-SET CSCL 08I

The aim of the research was to develop instruments and techniques and then make measurements of suitable power parameters, ground fault currents and ground resistance beds. With such information available, it was possible to develop a meaningful simulator which would permit investigating electrical systems and components on paper without costly trail and error procedures. In the third year, a cable splice testing program was added to the project. While there were the usual delays attendant in such original research, these, objectives were achieved. Evaluation of several mine electrical systems and components are presented. GRA

N74-27919# Cincinnati Univ., Ohio. Dept. of Mechanical Engineering.
A NEW COOLING METHOD FOR METAL CUTTING TOOLS Final Report on Phase 2, 1 May 1971 - 31 Oct. 1972
Neal P. Jeffries and Peter R. Marks Aug. 1973 46 p refs

(Contract N00197-71-C-0306)
(AD-778343; NOSL-MT-018) Avail: NTIS CSCL 13/8

The report is a follow-on of Phase I and presents the improvements made on the tool, and test results under a variety of cutting conditions. The improvements tested included the following: An integrated wick-shim design, a positive coolant feed, thin inserts, copper-plated inserts, metal-sheathed coolant tubing, improved flow valve, and improved coolant properties. The results indicated that most of the innovations were effective and practical. The testing results showed that the internally-cooled tool could be operated vertically as well as horizontally, and it could be used successfully on a wide variety of materials. An economic analysis of the cutting test results demonstrates that considerable financial savings can be obtained by using the internal cooling method. Also the effects on the environment are not detrimental; that is, no air pollution, water pollution, noise problems, or other environmental problems have been encountered. This is considered to be an improvement over conventional cooling methods of flood or mist cooling. Author (GRA)

N74-27920# National Bureau of Standards, Washington, D.C. Inst. for Materials Research.
METALLURGICAL ANALYSIS OF WEAR PARTICLES AND WEARING SURFACES Final Report
A. W. Ruff Apr. 1974 48 p refs
(Contract NAonr-31-7316)
(AD-778340; NBSIR-74-474) Avail: NTIS CSCL 13/9

The initial approach has been concerned primarily with the examination of particles recovered by the ferrographic technique from samples of lubricating oils taken periodically during tests and service of bearings, gears, sliding surfaces, etc., in which such experimental variables as lubricants, lubricant additives, bearing materials, loads, etc., have been studied. Examinations have been conducted principally using both scanning and transmission electron microscopy techniques, observing particle shapes, sizes, surface structures and other parameters as functions of distance along the ferrogram and determining a semi-quantitative elemental chemical analysis of selected and typical particles. These electron microscope techniques have been used to characterize the wear particles and associated surface degradation produced in the bearing and gear tests conducted by others. They provide information on particles and surface details too small for study by optical microscopy methods.
Author (GRA)

N74-27921# McDonnell Aircraft Co., St. Louis, Mo.
EVALUATION OF Ti-3 Al-2.5 V TITANIUM ALLOY HYDRAULIC TUBING Final Report, Jun. 1972 - Jan. 1974
L. R. Sanders Wright-Patterson AFB, Ohio AFML Apr. 1974 100 p refs
(Contract F33615-72-C-1923)
(AD-778097; AFML-TR-74-55) Avail: NTIS CSCL 13/11

The program determined the effect of several Ti-3Al-2.5V hydraulic tubing manufacturing techniques and common tubing defects on rotary flexure fatigue life of the tubing. Test results showed cold worked and stress relieved 105 ksi minimum tensile yield strength tubing and annealed 70 ksi minimum tensile yield strength tubing have approximately the same fatigue life. It was shown that belt sanding the tubing outer surface and then pickling both the inside and outside surfaces was the best surface preparation method evaluated. Grit blasting of the tubing inner surface or glass bead peening of the tubing outer surface offered no improvement in fatigue life and in some cases actually reduced fatigue life. The balance of the program was devoted to determining the effect of tubing imperfections. (Modified author abstract) GRA

N74-27922# Boeing Vertol Co., Philadelphia, Pa.
NUTATING MECHANICAL TRANSMISSION (MAROTH DRIVE PRINCIPLE) Final Report, 30 Jun. 1972 - 31 Jan. 1974
Raymond J. Drago and A. J. Lemanski Jan. 1974 251 p
(Contract N00014-72-C-0272; NR Proj. 259-102)
(AD-777988; D210-10747-1) Avail: NTIS CSCL 13/9

The final report presents an analysis defining the operational characteristics and potential load capacity of the nutating mechanical transmission (NMT) concept. Since a fully operational NMT capable of any substantial loading has not been constructed, the scope of this program has been largely analytical. Substantial technology has been borrowed from the gear and bearing fields to provide a sound basis for the derivation of some aspects of the analysis. To provide a clear, concise description of the NMT and its applications, limitations, and benefits, the main body of this report presents equations derived as required. For completeness, the full analysis (including applicable equations, figures, etc.) is presented as an appendix. Capsule summaries in the form of narrative figures are used throughout the main body of the report to highlight key topics. (Modified author abstract)
GRA

N74-27712 Joint Publications Research Service, Arlington, Va.
READING LIST ON QUALITY CONTROL PROBLEMS
N. P. Stepanov *In its* Microcircuits and Field Transistors (JPRS-62192) 7 Jun. 1974 p 27-31 refs Transl. into ENGLISH from Elektron. Tekhn. (Moscow), no. 5, 1972 p 109-111 (For availability see N74-27707 17-10)

N74-28005* Scientific Translation Service, Santa Barbara, Calif.
STUDY OF THE POSSIBILITY OF USING SOLAR RADIANT ENERGY FOR WELDING AND BRAZING METALS
V. S. Dvernyakov, I. N. Frantsevich, V. V. Pasichnyy, N. A. Shiganov, Yu. I. Korunov, and I. Ye. Kasich-Pilipenko *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 9-18 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 9-14 (For availability see N74-28003 17-18)
CSCL 13H

N74-28009* Scientific Translation Service, Santa Barbara, Calif.
INFLUENCE OF LOW TEMPERATURES OF FRICTION AND WEAR
V. F. Udovenko and G. N. Presnyakova *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 65-75 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 38-43 (For availability see N74-28003 17-18)
CSCL 11H

N74-28013* Scientific Translation Service, Santa Barbara, Calif.
EFFECTIVENESS OF SOLID LUBRICANT COATINGS FOR FRICTION IN HARD VACUUM (10-9 tor)
B. I. Verkin, I. M. Lyubraskiy, V. F. Udovenko, and L. N. Sentyurikhina *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 99-112 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 54-60 (For availability see N74-28003 17-18)
CSCL 11H

N74-28024 Minnesota Power and Light Co., Duluth.
USE OF WESTERN COAL AND AIR WATER QUALITY CONTROL BY MINNESOTA POWER AND LIGHT COMPANY
E. F. McGuire and W. F. Arndt (Abe W. Mathews Eng. Co., Hibbing, Minn.) *In* Bur. of Mines Technol. and Use of Lignite 1972 p 40-48 (For availability see N74-28020 17-18)

N74-28028 Joy Mfg. Co., Los Angeles, Calif. Western Precipitation Div.
COLLECTING FLY ASH FROM WESTERN LOW SULFUR COALS
James L. Ma *In* Bur. of Mines Technol. and Use of lignite 1972 p 83-97 refs (For availability see N74-28020 17-18)

N74-28029 Joy Mfg. Co., Los Angeles, Calif.
PILOT STUDY OF ELECTROSTATIC PRECIPITATION FOR REMOVING FLY ASH AT BASIN ELECTRIC'S LELAND OLDS STATION
Kent E. Janssen (Basin Elec. Power Coop., Stanton, N. Dak.) and Floyd W. Redman *In* Bur. of Mines Technol. and Use of Lignite 1972 p 98-104 ref (For availability see N74-28020 17-18)

N74-28378* Kanner (Leo) Associates, Redwood City, Calif.
ACOUSTIC DETERMINATION OF CRACKS IN WELDED JOINTS
Macsimilian Baltanoiu and Elvira Criciotoiu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 93-97 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului i Vibratiilor, Bucharest, 29-31 May 1973 p 127-132 (For availability see N74-28363 17-32)
CSCL 13E

N74-28379* Kanner (Leo) Associates, Redwood City, Calif.
CONSIDERATIONS ON THE ACOUSTIC ENERGY RADIATED BY TOOTHED GEARS
N. G. Popinceanu and I. Kremmer *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 98-103 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 135-140 (For availability see N74-28363 17-32)
CSCL 13I

N74-28380* Kanner (Leo) Associates, Redwood City, Calif.
PRELIMINARY STUDY OF GEAR NOISE CHARACTERISTICS
M. D. Gafitanu and R. H. Lyon *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 104-111 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului i Vibratiilor, Bucharest, 29-31 May 1973 p 143-148 (For availability see N74-28363 17-32)
CSCL 13I

N74-28381* Kanner (Leo) Associates, Redwood City, Calif.
LOAD INFLUENCE ON GEAR NOISE
V. Merticaru *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 112-117 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Gzomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 151-156 (For availability see N74-28363 17-32)
CSCL 13I

N74-28382* Kanner (Leo) Associates, Redwood City, Calif.
CONTRIBUTIONS TO THE REDUCTION OF GEAR NOISE
I. Kremmer *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 118-123 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 159-164 (For availability see N74-28363 17-32)
CSCL 13I

N74-28383* Kanner (Leo) Associates, Redwood City, Calif.
ASPECTS OF REDUCING SPUR GEAR NOISE
Horia Giurgiuman, Mircea Cretu, and Ion Moraru *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 124-130 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 167-173 (For availability see N74-28363 17-32)
CSCL 13I

N74-28384* Kanner (Leo) Associates, Redwood City, Calif.
CONTRIBUTIONS TO THE STUDY OF THE CHARACTERISTICS OF BEARING NOISE AND VIBRATIONS
M. D. Gafitanu, N. G. Popinceanu, D. Radauceanu, and I. Oancea *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 131-135 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 175-179 (For availability see N74-28363 17-32)
CSCL 13I

N74-28391* Kanner (Leo) Associates, Redwood City, Calif.
NOISE CONTROL OF PNEUMATIC PERCUSSION DRILLS
A. Darabont and St. Soiman *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 177-181 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 231-238 (For availability see N74-28363 17-32)
CSCL 13I

16 MASERS

Includes applications of masers and lasers. For basic research see: 26 Physics, Solid-State.

N74-27923 Illinois Univ., Urbana.
A STUDY OF COORDINATION COMPLEX PHOTOPHYSICS BY LASER-EXCITED LUMINESCENCE Ph.D. Thesis
William Martin Watson, Jr. 1973 195 p
Avail: Univ. Microfilms Order No. 74-12236

Time-resolved, wavelength-resolved luminescence studies of several chromium (3), europium (3), and Terbium (3) coordination complexes were made possible by pulsed excitation with a nitrogen laser or one of two tunable dye lasers. The lifetime of divalent Eu(2+) is also reported. Five chromium (3) complexes displayed luminescence behavior which implied that intersystem crossing in these systems populates the luminescing state less than 100 ns. In particular, it was shown that the 4-T-2g state of trisacetyl acetonatochromium (3) in matrix isolation was short lived, even at 18 K. Hexacyanochromium (3) at 77 K in glassy solution did not fluoresce and 4.2 ms phosphorescence was observed with an unresolved initial intensity. Ligand localized triplet phosphorescence could not be detected from tris (dibenzoylmethido)chromium (3). However, previously reported relative quantium yields of several Cr(3)beta diketonate were interpreted as evidence of intermolecular energy transfer from the ligand localized triplet to the metal localized doublet of quartet or nearest energy. Dissert. Abstr.

N74-27924 Illinois Univ., Urbana.
THE STEREOMATRIX 3-D DISPLAY SYSTEM Ph.D. Thesis
Stephen Earl Whiteside 1973 48 p
Avail: Univ. Microfilms Order No. 74-12245

STEREOMATRIX is a large screen interactive 3-D laser display system which presents computer-generated wire figures stereoscopically. A presented image can be rotated, translated, and scaled by the system user and the perspective of the image is changed according to the position of the user. A cursor may be positioned in three dimensions to identify points and allows communication with the computer. Dissert. Abstr.

N74-27925 Illinois Univ., Chicago.
CHEMICAL LASER AMPLIFICATION PROPERTIES OF A UNIFORM, TURBULENT MIXING LAYER OF FLUORINE AND HYDROGEN Ph.D. Thesis
Ho-Tien Shu 1973 98 p
Avail: Univ. Microfilms Order No. 74-4649

The laser amplification properties of a turbulent mixing layer generating population inversion by chemical reactions of fluorine and hydrogen are analyed. In order to elucidate the basic aspects of this complicated problem, it is considered that two streams of equal mean velocity of fluorine and hydrogen, respectively, are made turbulent at a given point. The two streams are then allowed to mix downstream and to initiate the chemical reactions which generate the various inverted vibrational states of HF molecules. These pumping reactions, which are coupled to the collisional deactivation reactions and to the laser radiation field normal to the flow direction, are assumed to be infinitely fast. The first four vibrational levels of the HF molecules are considered in the present analysis. Dissert. Abstr.

N74-27926*# Techtran Corp., Glen Burnie, Md.
LASER GYROSCOPES
A. D. Bogdanov Washington NASA Jun. 1974 52 p refs Transl. into ENGLISH of the publ. "Giroskopy na Lazerakh" Moscow, Min. of Defense USSR Mil. Publishing House, 1973 p 1-72
(Contract NASw-2485)
(NASA-TT-F-15641) Avail: NTIS HC $5.75 CSCL 20E

A scientific description is given of the principle of operation, design, and basic characteristics of gyroscopic devices and lasers and the principle of operation of the laser gyroscope. A brief

survey is made of the applications of laser gyroscopes in navigational systems. Author

N74-27927# Joint Publications Research Service, Arlington, Va.
LASERS AND COMMUNICATIONS
V. Sipyagin 5 Jun. 1974 9 p Transl. into ENGLISH from Radio (Moscow), no. 3, 1974 p 15-16
(JPRS-62175) Avail: NTIS HC $4.00

An examination was made of the possibilities of constructing laser communications lines on the earth, underwater, and in space. Author

N74-27928# Defence Standards Labs., Maribyrnong (Australia).
A PARAMETRIC STUDY OF THE THERMAL BLOOMING OF HIGH POWER GAUSSIAN CO2 LASER-BEAMS IN THE ATMOSPHERE
B. C. H. Wendlandt Nov. 1973 21 p refs
(Rept-582) Avail: NTIS HC $4.25

The propagation of a focused or unfocused carbon-dioxide laser beam through air and clouds was studied by solving the appropriate non-linear differential equation numerically. An approximate formulation was used in which the radial distribution of the refractive index of air is replaced by a best fit quadratic distribution. Calculations were made on the variation of blooming with target distance and altitude under different atmospheric conditions. Consideration was given to diffraction, natural convection, saturation and self-focusing effects due to the finite molecular relaxation time of the atmosphere. Author

N74-27929# Defence Research Establishment Valcartier (Quebec).
AN EXCITATION CIRCUIT FOR TEA GRID LASER
J. L. Lachambre, J. Gilbert, and M. Cunningham Mar. 1974 14 p refs
(DREV Proj. 97-01-20)
(DREV-TN-2105/74) Avail: NTIS HC $4.00

A circuit employing a combination of inductive and capacitive elements designed to excite a double discharge grid-type TEA CO2 laser is described. The electrical and amplification characteristics of the excited medium were measured. Small signal gain coefficients were achieved with an electrical energy density of 100 mJ/cc being supplied to the discharge. Author

N74-27930# Max-Planck-Institut fuer Plasmaphysik, Garching (West Germany).
CONSTRUCTION, OPERATION, AND PROPERTIES OF TEA-CO2 LASERS
G. Decker, L. Kellerer, and H. Roehr Apr. 1973 37 p refs In GERMAN, ENGLISH summary
(IPP-1-134) Avail: AEC Depository Libraries HC $4.00

Experience in building and working with TEA-CO2 laser is reported. The influence of electrial parameters as well as gas mixture and pressure are discussed. The properties of the laser beam as divergence, power distribution, and spectrum are dealt with a long with problems of energy and power measurements. Author (NSA)

N74-27931# Max-Planck-Institut fuer Plasmaphysik, Garching (West Germany).
ELECTRON-BEAM INITIATED hf CHEMICAL LASER
R. W. F. Gross and F. Wesner Apr. 1973 45 p refs In GERMAN; ENGLISH summary
(IPP-4-110) Avail: AEC Depository Libraries HC $4.25

For hf chemical laser initiation, an electron gun with field emission cathode was developed. The gun produces a large-area electron beam with an amplitude of 5.5 kA, an electron energy of 120 keV, and a half-amplitude pulse length of 25 ns. A pump rate of 4 x 10 to the 24th power photons/sq cm s and a laser energy of 0.2 J/pulse were reached. The efficiency was 3.5% with reference to the electron beam energy. Author (NSA)

N74-27932# California Univ., Livermore. Lawrence Livermore Lab.
LASER-FUSION PROGRAM Semiannual Report, Jan. - Jun. 1973
S. S. Sussman, ed. 22 Aug. 1973 249 p refs
(Contract W-7405-eng-48)
(UCRL-50021-73-1) Avail: NTIS HC $7.60

Brief discussions are given for each of the following areas of research covered during this report period: solid state laser program, design analysis, component development, diagnostics, gas lasers, chemical lasers -- the iodine laser, basic studies and advanced concepts, laser propagation, laser plasmas, laser fusion, isotope separation, and program resources. NSA

N74-27933# Los Alamos Scientific Lab., N.Mex.
ELECTRON-BEAM-CONTROLLED GAS LASERS: DISCUSSION FROM THE ENGINEERING VIEWPOINT, PART 2: PROBLEMS IN THE ELECTRICAL DESIGN OF VERY HIGH ENERGY SYSTEMS
K. B. Riepe and R. E. Stapleton 1973 17 p refs Presented at 5th Symp. on Eng. Problems of Fusion Res., Princeton, N. J., 6 Nov. 1973 Sponsored by AEC
(LA-UR-73-1630-Pt-2; Conf-731114-40) Avail: NTIS HC $3.00

Some problem areas in the design of very-high-energy electron-beam-controlled short-pulse gas lasers are discussed. One of the prime areas of interest is the high-voltage pulse generators for driving the electron gun and gas pumping. The use of pulse-forming networks for improving energy-transfer efficiency is discussed. The use of thermionic cathode devices will require a large ac power installation. The properties of alternate electron sources (cold cathode and plasma cathode devices) are reviewed. The impact of laser beam energy density limitations on system geometry and electrical design are discussed. Author (NSA)

N74-27934# Naval Intelligence Support Center, Washington, D.C. Translation Div.
MOLECULAR GAS FLOWS, LASER EMISSION EFFECTS, AND CARBON DIOXIDE LASERS
10 Aug. 1973 54 p refs Transl. into ENGLISH from Zh. Prikl. Mekh. Tekh. Fiz. (USSR), no. 5, 1971 p 24-45, 171-173
(AD-777420; NISC-Trans-3456) Avail: NTIS CSCL 07/4

Contents: On the inversion population of CO2 Molecules in expanding gas flows; Screening of a surface vaporized by the effects of laser emission in temperature and ionization non-equilibrium; A quasi-stationary CO2 laser with pulsed stimulation. GRA

N74-27935# Avco-Everett Research Lab., Everett, Mass.
RAMAN LIDAR TRANSMISSOMETER DATA PROCESSING IN REAL TIME Final Report, 15 May 1972 - 15 May 1973
D. A. Leonard and B. Caputo Aug. 1973 41 p refs
(Contract N000600-71-C-0372)
(AD-777465) Avail: NTIS CSCL 09/2

A minicomputer with 8K memory was interfaced with a pulsed nitrogen laser Raman Transmissometer to provide real time data processing and display capability. Self-calibration, normalization and ambient background substraction are included in the minicomputer program software. Author (GRA)

N74-27936# Hughes Research Labs., Malibu, Calif.
LASER WINDOW SURFACE FINISHING AND COATING TECHNOLOGY Semiannual Technical Report, 1 May - 31 Oct. 1973
Morris Braunstein Dec. 1973 45 p refs
(Contract F19628-73-C-0243; ARPA Order 2415; AF Proj. 2415)
(AD-777888; AFCRL-TR-74-0032; SATR-1) Avail: NTIS CSCL 20/5

The authors report on the objectives and the progress achieved in a program to study the surface finishing and coating of laser windows. The program covers six technology areas: surface finishing, surface characterization, coating techniques, optical evaluation, chemical analysis, and laser window damage studies. Mechanical-chemical surface finishing results for KCl and ZnSe are discussed. Potassium chloride surfaces have been produced which result in KCl windows having improved damage resistance of = 130 J/sq cm. Laser damage to antireflection coated ZnSe windows, at 10.6 micrometers, appears to be limited to the bulk properties of ZnSe rather than to the surfaces or coatings. Germanium films produced by ion beam sputtering and by evaporation in ultrahigh vacuum onto KCl substrates have been evaluated and compared. The 10.6 micrometers calorimetric data and the chemical analysis of the Ge films obtained using

Rutherford backscattering and Auger analysis are reported. The analysis results show evidence for the presence of K and Cl incorporation in the Ge films prepared. Author (GRA)

N74-27937# McDonnell-Douglas Corp., St. Louis, Mo. Radiation Sciences Dept.
CARBON MONOSULFIDE AND CO PROBE LASER RESEARCH Final Report, 15 Jun. 1972 - 31 Jul. 1973
William Q. Jeffers and Howard T. Powell 31 Jul. 1973 86 p refs
(Contract N00014-72-C-0458)
(AD-777960; MDC-Q0498) Avail: NTIS CSCL 20/5

The subject contract was divided into two major efforts: (1) an investigation of CS-fueled CO chemical lasers, and (2) experimental measurements of CO vibrational relaxation by means of probe laser transient gain experiments. (Modified author abstract) GRA

N74-27938# General Electric Co., Philadelphia, Pa. Space Div.
CHEMICAL LASER SYSTEMS Interim Technical Report, 1 Sep. 1973 - 28 Feb. 1974
Milton J. Linevsky and Ralph A. Carabetta 28 Feb. 1974 35 p refs
(Contract DAAH01-73-C-0653)
(AD-778358; DOC-74SD4214) Avail: NTIS CSCL 20/5

A number of chemical reactions leading to the formation of vibrationally excited HCl have been studied spectroscopically employing a diagnostic technique developed during the earlier course of this program. An infrared interferometric technique has been employed to develop a diagnostic procedure which makes possible the spatial (time) measurement of the spontaneous HCl emission as a function of location along the flow axis of the reactor tube. During the course of the studies on the Cl - HI reaction, measurements were made of the atomic iodine (2p1/2) to (2p3/2) emission which has been observed to accompany that from HCl. A number of other HCl producing reactions have also been studied; a spectroscopic examination of the SO - N2O reaction to produce SO2(3B1) has been initiated and some additional work on the CS2/N2O/O2 flame laser has been carried out. Finally, a small effort to investigate means for efficiently producing metal atoms by chemical reaction has been initiated. In these experiments, Cu metal atoms were electrically excited by means of a pulsed electric discharge through CuCl vapor diluted with Argon. (Modified author abstract) GRA

N74-27939# Hughes Research Labs., Malibu, Calif.
STUDIES ON PASSIVE Q-SWITCH MATERIALS FOR LASERS Final Report, 15 Dec. 1972
J. David Margerum, Shi-Yin Wong, A. M. Lackner, M. J. Little, and M. L. Spaeth Jun. 1973 208 p refs
(Contract F33615-61-C-1171; AF Proj. 7367)
(AD-778066; AFML-TR-73-106) Avail: NTIS CSCL 20/5

The behavior of passive Q-switch (PQS) materials and the mechanisms responsible for fatigue were investigated for the purpose of achieving improved passive Q-switch materials for lasers. The research program emphasized basic chemical materials aspects of PQS dye solutions and their improvements. The investigation combined fundamental and applied research related to the use of materials as reliable and efficient passive Q-switches for ruby lasers. The work included the synthesis of dyes and studies of the photochemical fatigue processes as well as the optical saturation processes. Emphasis was placed on the improvement of PQS materials that can also act as mode-locking components. For this reason most of the work was done on polymethine-type of dye structures. GRA

N74-27940# Massachusetts Inst. of Tech., Cambridge.
ATMOSPHERIC PRESSURE GAS LASERS Semiannual Technical Report, 1 Jun. - 30 Nov. 1973
Hermann A. Haus Apr. 1973 77 p refs
(Contract DAHC04-72-C-0044; ARPA Order 0675)
(AD-778027) Avail: NTIS CSCL 20/5

The document contains reports on amplification of two high-intensity nanosecond TEA CO2 laser pulses, mode locking, and a closed-form analysis of electronic distribution and pumping rates. GRA

N74-27941# Rockwell International Corp., Anaheim, Calif. Electronics Research Div.
TUNABLE 10 MICRON LASER, AN INTEGRATED OPTICS APPROACH TO INFRARED GAS LASERS Final Report, 1 Jun. 1972 - 31 Dec. 1973
J. D. McMullen and R. L. Davis 28 Feb. 1974 73 p refs
(Contract N00014-72-C-0505)
(AD-778018; C72-650.21/501) Avail: NTIS CSCL 20/5

The development of an integrated optics approach to a tunable CO2 laser for application as a master oscillator or local oscillator employing a hollow planar waveguide structure is delineated herein. Laser operation has been demonstrated using a planar waveguide with transverse flow and transverse excitation, longitudinal flow and longitudinal excitation, all of which have had thickness dimensions between 470 and 1000 microns with pressures near 80 torr. The above lasers have employed spherical and cylindrical Fabry-Perot reflectors. (Modified author abstract) GRA

N74-27942# Parke Mathematical Labs., Inc., Carlisle, Mass.
MATHEMATICAL MODELING OF EFFECT OF MATERIAL PARAMETERS ON IR LASER WINDOWS Final Report, 1 Mar. 1971 - 28 Feb. 1974
Nathan Grier Parke, III Feb. 1974 30 p refs
(Contract F19628-71-C-0142; AF Proj. 5621)
(AD-777844; AFCRL-TR-74-0100) Avail: NTIS CSCL 20/5

A brief but complete summary in narrative form of the mathematical modeling done under the contract, including references to and descriptions of the papers and reports issued. The main areas of work have been: temperature stress in surface cooling of window materials, the algorithmic problems involved in the theory of multiphonon absorption in crystals, and the generalization of a new solution to the transport equation to encompass the Markovian anisotropic scattering of electrons in thin films. The solution of the equation for heat conduction in cylinders by the implicit alternating difference method is applied to the production of input data for thermal lensing problems and to a new method of obtaining the bulk absorption coefficient from calorimetric measurements. Author (GRA)

N74-27943# IBM Watson Research Center, Yorktown Heights, N.Y.
ELECTRON BEAM PUMPING OF LASER DYES Final Report, 1 Jul. 1972 - 31 Dec. 1973
R. T. Hodgson and S. C. Wallace 31 Dec. 1973 9 p refs
(Contract N00014-73-C-0072)
(AD-778032) Avail: NTIS CSCL 20/5

The report concerns the feasibility of electron beam pumped dye lasers. This work was undertaken because such lasers might be capable of producing powerful nanosecond pulse of visible light with a conversion efficiency as high as 5% from electrical energy into light. However, laser action could not be attained. The authors propose that high energy radiation results in indiscriminate ionization and excitation of the supporting solvent for the dye and hence a transient absorption of the fluorescent light. (Modified author abstract) GRA

N74-27944# Raytheon Co., Waltham, Mass. Research Div.
RESEARCH ON HALIDE SUPERALLOY WINDOWS Final Report, 20 Apr. 1972 - 30 Oct. 1973
Perry A. Miles, D. W. Readey, and R. T. Newberg Nov. 1973 177 p refs
(Contract F19628-72-C-0307; AF Proj. 2014)
(AD-778108; S-1642; AFCRL-TR-73-0758) Avail: NTIS CSCL 20/5

The fusion casting of alkali halides has been investigated as a means of preparing polycrystalline materials with optical properties approximating those of the corresponding single crystals. The successful production of highly transparent, low-loss blanks of pure KCl and strontium-doped KCl is described. Strengthening of KCl by solid-solution hardening of single crystals and by grain-size control and solid-solution effects in cast and hot-forged materials has been demonstrated to give yield strengths in excess of 9000 psi. Effects of precipitation on mechanical and optical properties are detailed, along with the effect of reactive gas treatments of optical blanks on their 10.6 micrometers low-loss coefficients. Protective films of As2S3 have been

deposited with a near intrinsic bulk loss of 1.5/cm measured at 10.6 micrometers. Author (GRA)

N74-27945# Texas Univ., Dallas.
INVESTIGATION OF THE FEASIBILITY OF THE ELECTRON BEAM-EXCITED, HIGH-PRESSURE RECOMBINATION LASER Semiannual Technical Report, 1 Sep. 1973 - 28 Feb. 1974
Carl B. Collins and Austin J. Cunningham 21 Mar. 1974 118 p refs
(Contract N00014-67-A-0310-007; ARPA Order 1807)
(AD-778033; UTPD-A002-4; SATR-4) Avail: NTIS CSCL 20/5

The report describes research applied toward the determination of the feasibility of developing a recombining, electron beam-excited plasma into a pulsed laser of exceptionally high peak power. Author (GRA)

N74-27946# Naval Research Lab., Washington, D.C.
MACROSCOPIC DESCRIPTION OF RADIATION PRESSURE FORCES IN LASER PRODUCED PLASMAS
John A. Stamper Apr. 1974 15 p refs
(NRL Proj. 77H02-29; NRL Proj. 77H02-34)
(AD-777986; NRL-MR-2775) Avail: NTIS CSCL 20/9

Radiation pressure forces play an important role both in macroscopic and microscopic processes in laser-produced plasmas. A complete description of the macroscopic processes includes radiation driven electric fields as well as radiation driven forces on the neutral plasma. It is shown that a simple expression for the force which has been applied to certain microscopic processes (e.g., parametric instabilities) ignores field momentum and does not give a general description of macroscopic processes. A theory is discussed which does give a general macroscopic description (absorption, reflection, refraction and magnetic field generation) and which reduces to the above expression, as expected, for sinusoidal fields in a neutral, homogeneous, non-absorbing plasma. Author (GRA)

N74-27947# Avco-Everett Research Lab., Everett, Mass.
MERCURY VAPOR LASER Final Report
Jun. 1973 75 p refs
(Contract N00014-72-C-0468)
(AD-778327) Avail: NTIS CSCL 20/5

The report describes work on a program to develop a high power laser utilizing the band emission of high density mercury excited by electrons. The spectroscopy and kinetics of excited mercury is discussed. The kinetics of energy exchange between low energy electrons and mercury is treated in detail, as is the problem of energy deposition for high voltage electrons penetrating a foil and the mercury gas. The authors describe the performance of the high voltage, cold cathode electron gun, developed as a laser driver during this contract. Author (GRA)

N74-27948# Columbia Univ., New York. Dept. of Chemistry.
DEVELOPEMENT OF METAL HALIDE LASERS Final Report, 1 Jul. 1972 - 1 Jun. 1973
Richard N. Zare 1 Jun. 1973 71 p refs
(Contract N00014-67-A-0108-0035)
(AD-778325) Avail: NTIS CSCL 20/5

Work was initiated to assess the feasibility of constructing a visible laser employing electronically excited metal halide molecules as an active media. Special attention was focussed on the group IIA metal monohalides. Fluorescence intensity versus time is plotted and a method of measuring radiative lifetime is developed. GRA

N74-27949# Pennsylvania State Univ., University Park. Materials Research Lab.
COATING SCIENCE AND TECHNOLOGY Semiannual Technical Report
B. E. Knox and K. Vedam 30 Nov. 1973 17 p refs
(Contract F19628-73-C-0219; AF Proj. 2145)
(AD-777886; AFCRL-TR-74-0038) Avail: NTIS CSCL 20/5

In order to better prepare coatings for infrared laser windows, a program has been initiated to thoroughly study the science and technology of the deposition of inorganic elements and compounds as thin films. Deposition techniques include sputtering, PVD, and CVD; characterization techniques include ellipsometry, SEM, X-ray emission analysis, IR and Raman spectroscopy, ISS, AES, SIMS, and strain measurements. Extensive theoretical calculations by Loomis have shown that effective coatings with the requisite optical properties can be prepared using two-layer films of the appropriate materials and thicknesses. Germanium can be used as the first layer on KCl, ZnSe and CdTe window materials, the second layer can be chosen (theoretically) from a number of other materials. Since this laboratory has extensive experience in the controlled deposition of germanium films, efforts are being concentrated on using this material as the first layer film. (Modified author abstract) GRA

N74-27950# Stanford Research Inst., Menlo Park, Calif.
EXCIMER FORMATION AND DECAY PROCESSES IN RARE GASES Final Report
Donald C. Lorentz, Donald J. Eckstrom, and David L. Huestis 28 Sep. 1973 67 p refs
(Contract N00014-72-C-0457; SRI PYU 2018)
(AD-778326; SRI-MP73-2) Avail: NTIS CSCL 20/5

A model of the excimer formation and decay processes in electron beam pumped high density rare gases has been developed. The model has been compared with recent measurements of the excimer formation and decay rates in Xe and information about the radiative lifetimes and dominant collision mechanisms are obtained. Several important conclusions that have bearing on the vuv laser characteristics of these systems are discussed. Author (GRA)

N74-27951# ILC Technology, Inc., Sunnyvale, Calif.
OPTICAL PUMPS FOR HOLMIUM LASERS Triannual Report, 1 Nov. 1972 - 28 Feb. 1973
Lowell Noble, Robert Maynard, and Harry Flentz Dec. 1973 29 p refs
(Contract DAAB07-72-C-0274; DA Proj. 1S7-62703-A-186)
(AD-777810; R-ILC-73-12; ECOM-0274-2-72; TAR-2) Avail: NTIS CSCL 20/5

The purpose of the program is to produce more efficient pulsed optical pumps for use with holmium-doped yttrium lithium fluoride laser materials (Ho:YLF). Prior to this program, the best efficiency obtained was a lasing threshold at 8 joules input and 20 mJ laser output at 10 joules input. The most efficient optical pump now appears to be a clear fused quartz lamp of 2.5 to 3.0 mm bore diameter filled with xenon to high pressure, e.g., 4500 torr, and operated with a simmer current. The Mode I goal of 30 mJ output for 10 J input has been exceeded by a factor of two using a 3 mm bore, 3000 torr lamp. However, the Mode II goal of 100 mJ output for 10 J input will require further lamp improvements and perhaps cavity improvements as well. Author (GRA)

N74-27952# Naval Postgraduate School, Monterey, Calif.
CONTROLLED TURBULENCE AS A DESIGN CRITERION FOR ELECTRIC DISCHARGE CONVECTION LASERS M.S. Thesis
Leman John Aurichman, Jr. Mar. 1974 49 p refs
(AD-777874) Avail: NTIS CSCL 20/5

The thesis is primarily concerned with the application of controlled turbulence to electric discharge convection lasers (EDCLs). A preliminary design of a closed-cycle, EDCL system has been accomplished. Experimental investigations into the mechanisms of turbulent flow and its stabilization of gaseous, electric discharges were made. Spectral distribution, velocity profile, and power consumption data taken in a discharge region are presented. Turbulence was generated by various screens or combination of screens in an attempt to further understand the phenomena involved. Author (GRA)

N74-27953# General Electric Co., Philadelphia, Pa. Space Div.
DEVELOPMENT OF RANGE SQUARED AND OFF-GATING MODIFICATIONS FOR A LIDAR SYSTEM Environmental Protection Technology Series Final Report, 27 Jun. 1972 - 5 Sep. 1973
George W. Bethke Sep. 1973 54 p
(Contract EPA-68-02-0570)
(PB-228715/9; EPA-650/2-73-040) Avail: NTIS HC $5.75 CSCL 17/4

The study was intended to eliminate the dominant source

of error in the remote measurement of smoke-stack plumes using lidar, and to improve the data presentation of the lidar transmittance measurement. The use of a special grid-controlled photomultiplier tube and off-gating system has resulted in a large reduction of photomultiplier tube afterpulsing which was the principal problem limiting the accuracy of plume transmittance measurements. A range-correcting time-squared amplifier was also developed which permits much faster and more convenient data reduction. The above two developments adapted to an existing van-mounted EPA lidar system. Author (GRA)

N74-27954# Illinois Univ., Urbana. Coordinated Science Lab.
A DIGITAL TECHNIQUE OF WAVEFRONT RECONSTRUCTION AT SUBOPTICAL FREQUENCY FROM A LINEAR SAMPLING OF THE DIFFRACTION PATTERN M.S. Thesis
Peter Chi-Chung Lam Sep. 1973 58 p refs
(Contract DAAB07-72-C-0259)
(AD-777451; R-625; UILU-ENG-73-2227) Avail: NTIS CSCL 14/5

An approximate but efficient method is developed for reconstructing an aperture distribution from its diffracted field recorded suboptical frequency. This method has potential application in acoustic or microwave holography. In this investigation, an attempt is made to reconstruct an aperture from its diffracted field which is recorded by a one-dimensional array of detectors located either on the x-axis or on the y-axis. From the reconstructed image, the approximate size and location of the aperture are determined. The paper comprises five chapters. Section 1.2 will briefly describe the Abbe-Porter experiments that give rise to the technique. The second chapter covers the analytic implication of such a technique. The third chapter describes the digital simulation and the pattern-recognizing process used to distinguish the reconstructed patterns of different apertures. The fourth chapter presents results obtained using simple apertures as the objects (rectangular, semicircular, and triangular apertures). Finally, concluding remarks are made in the fifth chapter. GRA

17 MATERIALS, METALLIC

Includes cermets; corrosion; physical and mechanical properties of materials; metallurgy; and applications as structural materials. For basic research see 06 Chemistry. For related information see also 18 Materials, Nonmetallic; and 32 Structural Mechanics.

N74-27955 Florida Univ., Gainesville.
HIGH TEMPERATURE COMPRESSIVE CREEP OF SINTERED NICKEL Ph.D. Thesis
Walter Ralph Tarr 1973 142 p
Avail: Univ. Microfilms Order No. 74-10095

Compressive creep of sintered nickel was performed under a range of conditions. The data show that the creep rate was determined by the load on an effective cross section of material which was determined to be the fracture cross section in tension. This cross section called the area fraction of fracture surface is designated. The effect of sintering on the creep process was determined to be primarily one of returning the pore shape to isotrophy after the pore was deformed in creep.
Dissert. Abstr.

N74-27956 Michigan State Univ., East Lansing.
BANDING AND ITS INFLUENCE ON THE IMPACT AND FATIGUE PROPERTIES OF HIGH STRENGTH SAE 4340 STEEL Ph.D. Thesis
Anil Venkat Rao 1973 193 p
Avail: Univ. Microfilms Order No. 74-13958

An investigation was undertaken to study the phenomena of banding and its influence on the impact and fatigue properties of two high-strength SAE 4340 steels which differed in their inclusion ratings. In both the as-received and the quenched-and-drawn conditions, the materials exhibited banding which, upon analysis, showed a segregation of phosphorus, managanese, chromium, nickel, and molybdenum in the bands. Upon a high-temperature homogenization treatment at 2350 F for 20 hours, the segregation was reduced to a sufficient degree to eliminate banding. Comparison of the properties of the homogenized and the banded specimens in the tempered martensitic state showed that the elimination of banding resulted in significant improvements in both the impact and fatigue strength. An explanation is given to account for this behavior.
Dissert. Abstr.

N74-27957 Maryland Univ., College Park.
THE INFLUENCE OF GRAIN SIZE ON THE MECHANICAL PROPERTIES OF THE POWDER METALLURGICALLY PROCESSED NICKLE BASE ALLOYS: MONEL AND ASTROLOY Ph.D. Thesis
Elbert Kelsey Weaver 1973 135 p
Avail: Univ. Microfilms Order No. 74-12826

Monel and Astroloy powders were forge consolidated to greater than 98.7 percent of the density of these materials in conventional cast wrought iron. Metallurgical grain size ranges from ASTM 2.8 to ASTM 11.5 for Monel and from ASTM 3.4 to ASTM 9.6 for Astroloy were produced by thermomechanical processing and heat treatment. The importance of metallurgical grain size on the room temperature hardness and on the 371 C and 593 C tensile yield stress was assessed for powder metallurgically processed Monel. The room temperature hardness and the tensile yield stress at both temperatures were improved by grain refinement according to a Hall-Petch relation. Second stage creep rates also were determined for the material at nominal testing conditions. Dissert. Abstr.

N74-27958 Arizona Univ., Tucson.
PRODUCTION OF PURE ZIRCONIUM BY USE OF A RADIO FREQUENCY PLASMA Ph.D. Thesis
Frederick Michael Gragg 1973 99 p
Avail: Univ. Microfilms Order No. 74-11468

The production of zirconium in an argon radio frequency induction plasma was investigated. The object of the research was to study the feasibility of producing zirconium in an induction plasma. The reduction of zirconium tetrachloride to zirconium was accomplished in a reactor powered by a 25 kw 4 MHz generator. The plasma was contained in a water-cooled Vycor tube. The argon used as a carrier gas was dried by a mole sieve bed before entering either the plasma reactor or the feed system. Reagent grade zirconium tetrachloride was fed by means of a sublimation feed system. This system not only further purified the zirconium tetrachloride but also feed the zirconium tetrachloride as a gas which has transfer advantages. It was concluded that the production of zirconium from zirconium tetrachloride is technically feasible. An economic analysis, however, showed that economical production of zirconium by use of a plasma is still in doubt and future research is necessary. Dissert. Abstr.

N74-27959 Illinois Univ., Urbana.
MAGNETIC CLUSTERS IN DILUTE ALLOYS OF IRON IN COPPER-NICKEL SOLID SOLUTIONS Ph.D. Thesis
Sanak Mishra 1973 314 p
Avail: Univ. Microfilms Order No. 74-12118

The magnetization of quenched Cu(0.9)Ni(0.1) and Cu(0.8)Ni (0.2) alloys containing 100 to 1000 ppm was quantitatively accounted for in terms of magnetic clusters associated with 1.2 and 3 or more Fe atoms. The ratio of the Fe pair clusters to that of single Fe clusters is at all Ni and Fe concentrations much higher than the corresponding ratio calculated on the basis of a random alloy model which assumes long range interaction between Fe moments. Hence Fe-Fe clusters have to be postulated. The nearest neighbor short range order parameter, corresponding to experimental concentration ratios, increases with the Fe concentration but decreases with the Ni concentration. The dipole moment connected with the single Fe clusters is larger than that expected for Fe alone, and increases with the Ni content. These findings can be accounted for if a contribution to the cluster moment from nearest neighbor Ni atoms is assumed.
Dissert. Abstr.

N74-27960 Michigan State Univ., East Lansing.
EXPERIMENTAL INVESTIGATION OF TRANSIENT THERMAL PROPERTY CHANGES OF ALUMINUM 2024-T351 Ph.D. Thesis
Sami Raouf Al-Araji 1973 168 p
Avail: Univ. Microfilms Order No. 74-13854

When as-received aluminum 2024-T351 is heated to 350 F, changes in the microstructure take place. These changes are further enhanced by heating to higher temperatures and/or longer times. This heating results in increases in the thermal conductivity (k) and specific heat (C sub P) values of the aluminum. A simplified method proposed by Beck was used to determine the transient values of K and C sub P. It was found that the changes in K can approach 25% while those for C sub P are less. The changes in K follow a certain pattern. This pattern begins with a value of K when the specimen arrives at a given temperature (in the range 350 to 425 F) then K increases to some maximum value while it is maintained at that temperature. The rate of increase depends on the temperature level (the closer the temperature to 425 F the faster it arrives at the maximum value). After it stays at the maximum value for a period of time (for example, at 425 F it stays for about 15 to 20 minutes) K starts to drop until it reaches a certain value where it remains relatively constant with time. At this stage the aluminum becomes over-aged.
Dissert. Abstr.

N74-27961 Arizona Univ., Tucson.
MECHANICAL ANALOGS OF NONLINEAR STRESS-STRAIN HYSTERESIS IN METALS Ph.D. Thesis
Ernest Martin Honig, Jr. 1973 293 p
Avail: Univ. Microfilms Order No. 74-11214

A first-order nonlinear differential equation whose variables are stress, strain, and the first derivatives of these quantities, was fitted to steady-state stress-strain hysteresis loops of a spheroidized 1078 carbon steel for four amplitudes of strain. It was shown that the differential equation, or model, using terms obtained from the fitting of the model to a given hysteresis loop, could predict any other hysteresis loop obtained for this material. It is proposed that this model be used to predict the mechanical response of a metal to an arbitrary non-static mechanical cyclic input, or loading. The motivation of studying the mechanical energy dissipation, or damping, properties of materials at strain amplitudes of engineering interest is discussed. Both historical and recent literature are surveyed. The analysis of stress-strain hysteresis in metals by means of rheological models is discussed. Dissert. Abstr.

N74-27962# Bureau of Mines, Albany, Oreg. Metallurgy Research Center.
SPARK-SHOWER RADIANCE OF METAL GRINDING SPARKS
John E. Kelly and Robert Blickensderfer 1974 28 p refs
(BM-RI-7902) Avail: NTIS HC $4.50

The spark-shower radiance of metals when abraded on a grinding wheel was reported for evaluating the sparking tendency of metals. The radiance was measured in units of emissive power per solid angle per area of the detector. Over 100 metals were tested and rated relative to commercially pure iron. The metals tested included elemental metals, iron binary and ternary alloys, iron-carbon ternary alloys, commercial steels, nonferrous alloys, and a few hard-metal compounds. Some alloys were synthesized; others were obtained commercially. Alloys that possessed good strength properties were emphasized for selection. The results indicate that the spark-shower radiance of plain carbon steels and carbon alloy steels was greater than that of pure iron. Certain elements, particularly vanadium and chromium, reduced the sparking tendency of iron. Stainless steels and particularly nickel alloys displayed low spark-shower radiance. Some metallic elements had much lower radiance that iron; others, much greater. Plain carbon steels, heat treated to a variety of hardnesses, gave radiance values that generally increased with increasing hardness. Author

N74-27963*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COATING SUPERALLOYS Patent Application
Michael A. Gedwill and Salvatore J. Grisaffe, inventors (to NASA) Issued 27 Jun. 1974 10 p
(NASA-Case-LEW-11696-3; US-Patent-Appl-SN-483853) Avail: NTIS HC $4.00 CSCL 11F

An analysis was made of the protection provided to superalloy and dispersion strengthened alloy surfaces by an aluminized coating. The coatings have long time oxidation and thermal fatigue resistance properties. NASA

N74-27964*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
POWDER METALLURGY APPROACHES TO HIGH TEMPERATURE COMPONENTS FOR GAS TURBINE ENGINES
Hubert B. Probst 1974 12 p refs Presented at 8th Plansee Seminar on Refractory and Wear Resistant Mater., Tyrol, Austria, 27-30 May 1974
(NASA-TM-X-71528; E-7927) Avail: NTIS HC $3.00 CSCL 11F

Research is reported for the tensile strength, ductility, and heat performance characterisitics of powder metallurgy (p/m) superalloys. Oxide dispersion strengthened alloys were also evaluated for their strength during thermal processing. The mechanical attributes evident in both p/m supperalloys and dispersion strengthened alloys are discussed in terms of research into their possible combination. A.A.D.

N74-27965# Defence Standards Labs., Maribyrnong (Australia).
BRITTLE FRACTURE OF MILD STEEL BY DYNAMIC STRAIN AGEING
M. E. DeMorton Aug. 1973 33 p refs Presented at Conf. on Stress and Strain in Eng., Brisbane, Aug. 1973
(Rept-562) Avail: NTIS HC $4.75

The effects of temperature, strain rate, and interstitial alloying elements on mechanical properties during dynamic strain ageing are briefly reviewed. Experiments made on precracked bend specimens of quenched and tempered mild steel as a function of temperature and strain rate showed a marked loss in fracture toughness due to dynamic strain ageing. Fibrous fracture occurred by the formation of shallow dimples and an estimate of the effective surface energy associated with fracture was found to be an order of magnitude lower than for normal fibrous fracture. The effect of increasing the strain rate was to increase the temperature range where dynamic strain ageing occurred and to markedly increase the fracture toughness when fracture was by a fibrous mode. At lower temperatures where fracture occurred by a cleavage mechanism the normally expected decrease in fracture toughness with increasing strain rate was observed. An interpretation of these results is given in terms of the strain hardening characteristics of the material. Author

N74-27966# Royal Aircraft Establishment, Farnborough (England).
STRESS CORROSION CRACKING IN ALUMINIUM ALLOYS, WITH PARTICULAR REFERENCE TO THE PROPERTIES OF SURFACE FILMS: SURVEY OF THE LITERATURE
G. Mierke Oct. 1973 71 p refs Transl. into ENGLISH from the German report DLR-FB-71-105
(RAE-Lib-Trans-1718; DLR-FB-71-105; BR37622) Avail: NTIS HC $6.75

The susceptibility of aluminum alloys to stress corrosion cracking is partly influenced by the surface oxide film; the corrosive medium must first penetrate this film - locally, at least. In the propagation of the stress corrosion crack, oxide films can be reformed and again ruptured. This literature survey treats the theories of stress corrosion cracking, with emphasis on the effect of the oxide film. A detailed discussion of the properties of surface oxide films on aluminum and aluminum alloys follows. Electrochemical methods for the investigation of corrosion processes on aluminium are described. Finally, there is a discussion of the strength properties of aluminium alloys in corrosive media. Author

N74-27967# Royal Aircraft Establishment, Farnborough (England).
METALLURGICAL AND ELECTROCHEMICAL ASPECTS OF THE STRESS CORROSION CRACKING OF TITANIUM ALLOYS
Alain Vassel Feb. 1974 64 p refs Transl. into ENGLISH from the French report ONERA-Publ-145
(RAE-Lib-Trans-1743; BR39872; ONERA-Publ-145) Avail: NTIS HC $6.25

Linear elastic fracture mechanics was applied to the study of the stress corrosion cracking of two titanium alloys (Ti-6Al-4V and Ti-2.5Cu) in aqueous salt solutions. The Ti-Cu alloy in the quenched and aged conditions was found to be insensitive to stress corrosion cracking in the corrodent. The Ti-6Al-4V can be made nearly insensitive to stress corrosion cracking by heating

in the Beta range before the normal quenching and ageing treatment. Electron microautoradiography, using tritium as a tracer, has established that the mechanism of crack propagation in salt solutions is a form of hydrogen embrittlement. Author

N74-27968# California Inst. of Tech., Pasadena. W. M. Keck Lab. of Engineering Materials.
ELECTRIC AND MAGNETIC PROPERTIES OF Pd-Mn-P AMORPHOUS ALLOYS
N. I. Marzwell Nov. 1973 62 p refs
(Contract AT(04-3)-822)
(CALT-822-55) Avail: NTIS HC $5.25

The electric and magnetic properties of amorphous Pd-Mn-P alloys were studied in the range of 15 to 38 at.% manganese at a constant phosphorus concentration of 23 at.%. The effect of the 3d band filling of the first transition metal group, the phosphorus concentration effect that acts as an electron donor, and the transition metal concentration effect were studied. NSA

N74-27969# United Kingdom Atomic Energy Authority, Harwell (England). Research Group.
COMPATIBILITY OF TYPE 316 STAINLESS STEEL AND NITROGEN IN THE PRESENCE OF SODIUM
A. Yates and R. Paris Nov. 1973 14 p refs
(AERE-R-7607) Avail: AEC Depository Libraries HC $3.00; HMSO 50p; PHI $2.15

Type 316 stainless steel capsules containing sodium and a pure nitrogen cover gas were heat treated for five weeks at 250, 500, 600, and 700 C to discover if the presence of sodium led to any unacceptable nitridation of the clad. Effects observed which could be attributed to nitrogen enhanced by sodium vapor were small. It is concluded that traces of nitrogen in the plena of sodiumbonded fuel pins would have no deleterious effect.
Author (NSA)

N74-27970# Commissariat a l'Energie Atomique, Bruyeres-le-Chatel (France).
EFFECT OF HYDROGEN ON THE BEHAVIOR OF METALS. 2: HYDROGEN EMBRITTLEMENT OF THE TITANIUM ALLOY TV13CA: EFFECT OF OXYGEN; COMPARISON WITH NONALLOYED TITANIUM Ph.D. Thesis
J. P. Arditty Nov. 1973 194 p refs
(CEA-R-4528) Avail: AEC Depository Libraries HC $11.75

The effects of oxygen on hydrogen embrittlement of nonalloyed titanium and the metastable beta-titanium alloy, TV13CA, were studied during dynamic mechanical tests, the concentrations considered varying from 1000 to 5000 ppM (oxygen) and from 0 to 5000 ppM (hydrogen) respectively. TV13CA alloy has a very high solubility for hydrogen. The establishment of a temperature range and a rate of deformation region in which the embrittlement of the alloy is maximum leads to the conclusion that an embrittlement mechanism occurs involving the dragging and accumulation of hydrogen by dislocations. This is the case for all annealings effected in the medium temperature range, which, by favoring the re-establishment of the stable two-phase alpha + beta state of the alloy, produce hardening. The same is true for oxygen which, in addition to hardening the alloy by solid-solution effects, tends to increase its instability and, in consequence, favors the decomposition of the beta phase. Author (NSA)

N74-27971# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Technische Physik.
VOLUME DIFFUSION IN THE MOLYBDENUM-TUNGSTEN SYSTEM
W. Erley Aug. 1973 97 p refs In GERMAN
(JUL-991-TP) Avail: AEC Depository Libraries HC $7.00

Tungsten-molybdenum single crystal paris were annealed in the temperature range from 1,900 to 2,250 C in high vacuum for 100 hours. Following corresponding metallurgical treatment, the concentration profiles were measured with an electron beam microprobe and from these, the concentration-dependent chemical diffusion coefficient for relative Mo concentrations between 0.1 and 0.9 was determined using the Boltzmann-Matano method. From the impurity diffusion coefficients, the self-diffusion coefficients of tungsten or molybdenum, and from tracer diffusion coefficients of molybdenum in various W-Mo alloys in the literature, and with the help of an empirical relationship for tracer diffusion coefficients in dense mixable bimaterial systems, concentration- and temperature-dependent tracer diffusion coefficients of tungsten or molybdenum can be given. Comparison with experimentally determined chemical diffusion coefficients showed good agreement. NSA

N74-27972# Republic Steel Corp., Cleveland, Ohio.
INTERNAL FRICTION OF FERROUS MARTENSITES
G. J. Klems, R. E. Miner, F. A. Hultgren, and R. Gibala (Case Western Reserve Univ.) 31 Oct. 1973 11 p refs Presented at Conf. on Internal Friction and Ultrasonic Attenuation in Crystalline Solids, Aachen, Aug. - Sep. 1973
(Contract AT(11-1)-1676)
(COO-1676-29; Conf-730844-2) Avail: NTIS HC $3.00

An analysis of data on martensites in Fe-Ni-C, Fe-C, and Fe-Si-C alloys is presented. Results show that two distinct internal friction peaks occur in ferrous martensites which contain carbon. One relaxation peak at approximately 160 C at 1 Hz is associated with twin boundary-carbon interaction; the other is a cold-work-type peak at 250 C at 1 Hz, and is associated with dislocation-carbon interaction. Identification of the appropriate mechanisms of these peaks has been accomplished by detailed correlation of the peak characteristics with martensite structure, martensite morphology, and carbon precipitation behavior. NSA

N74-27973# Northwestern Univ., Evanston, Ill. Dept. of Materials Science.
EFFECT OF POINT DEFECTS ON MECHANICAL PROPERTIES OF METAL Technical Progress Report, 1 Jan. - 31 Dec. 1973
M. Meshii 1973 14 p refs
(Contract AT(11-1)-1367)
(COO-1367-56) Avail: NTIS HC $3.00

The major research effort was on iron. The recovery of the electron irradiation effect was studied in pure iron and iron-carbon alloys. This investigation resulted in several new findings in addition to the confirmation of two assumptions used in the interpretation of the mechanical effects of electron irradiation on high-purity iron single crystals. The irradiation softening effect was studied in single crystals oriented for the slip and polycrystalline specimens. A striking orientation effect was discovered and a large irradiation softening was found in single crystal specimens oriented for the hard slip. In this orientation, more than 60% of the yield stress is reduced by electron irradiation; thereby, the hardest orientation becomes the softest orientation following electron irradiation. The solution softening and hardening effects of carbon atoms were investigated using high-purity iron single crystals similar to those used in the irradiation-softening study. Author (NSA)

N74-27974# California Univ., Livermore. Lawrence Livermore Lab.
FATIQUE OF WELDED 5083 ALUMINUM ALLOY
J. E. Hanafee 19 Dec. 1973 9 p ref
(Contract W-7405-eng-48)
(UCID-16401) Avail: NTIS HC $3.00

A failure analysis was conducted on an aluminum structure subjected to fatigue testing. Failure occurred by fatigue in an electron-beam weld. The cycles to failure were reasonable for the loading conditions. Author (NSA)

N74-27975# California Inst. of Tech., Pasadena. Keck (W. M.) Lab. of Engineering Materials.
SUPERCONDUCTING COMPOSITE OF COPPER AND NIOBIUM: A METALLURGICAL APPROACH
C. C. Tsuei Oct. 1973 18 p refs
(Contract AT(04-3)-822)
(CALT-822-54) Avail: NTIS HC $3.00

A study was made of the superconducting properties of Cu-Nb wires prepared by casting and rolling: Cu100-x Nbx and Cu100-1.33x NbxAl0.33x, where x = 0.7 to 20, and Cu89.5 Nb10 A10.5. Metallography, electron microscopy, and X-ray diffraction were also used. Transition temperatures and critical currents were measured. NSA

N74-27976# Naval Research Lab., Washington, D.C.
PROPERTIES OF 17-4PH STEEL Final Report
R. W. Judy, Jr., C. T. Fujii, and R. J. Goode 18 Dec. 1973 24 p refs

(NRL Proj. M01-30)
(AD-777095; NRL-7639) Avail: NTIS CSCL 11/6

17-4PH stainless steel was investigated for its fracture and stress corrosion cracking properties under both open circuit and cathodically coupled conditions. Established fracture mechanics test and interpretation procedures were used to determine the suitability of this material for use in the marine environment. The material was found to be sensitive to environmental cracking processes to such a degree that the characteristic K(Iscc) values for the conditions of cathodic coupling were extremely low for materials in the strength range of interest. Evidence of crack growth was found on the fractured surfaces of test specimens of 17-4PH steel. The conclusions of this investigation were that brittle fracture is not a problem for 17-4PH, but environmental crack growth is expected to cause maintenance problems for structures designed for long life. (Modified author abstract) GRA

N74-27977# Virginia Polytechnic Inst. and State Univ., Blacksburg. Coll. of Engineering.
FRACTURE TOUGHNESS DETERMINATION UTILIZING THE NOTCHED HOLLOW ROUND TEST SPECIMEN
R. P. McNitt and D. Phung Jan. 1974 37 p refs
(Contract DAAF07-69-C-0444)
(AD-777528; VPI-E-74-2) Avail: NTIS CSCL 11/6

Experimental evidence concerning the determination of (K sub IC) is presented. Tests encompass three types of aluminum and two steels. It is concluded that valid (K sub IC) data is attained from notched hollow round specimens in tension as long as the ratio of notch stress to yield stress < or = 1.1. (Modified author abstract) GRA

N74-27978# Army Materials and Mechanics Research Center, Watertown, Mass.
MECHANICAL PROPERTY SURVEY FOR ELECTROSLAG REMELT PROCESSED STEELS Final Report
Charles F. Hickey, Jr. Mar. 1974 32 p refs
(DA Proj. 1T1-62105-A-328)
(AD-778169; AMMRC-MS-74-4) Avail: NTIS CSCL 11/6

Results of a state-of-the-art survey on the mechanical properties of electroslag remelt (ESR) processed steels are presented. Where possible, comparisons have been made between air-melted, vacuum-arc-remelted, vacuum-induction-melted, and ESR processed steels of the same composition. Mechanical property areas where data do not exist are also indicated.
Author (GRA)

N74-27979# Failure Analysis Associates, Stanford, Calif.
FRACTURE TOUGHNESS AND FATIGUE PROPERTIES OF TITANIUM LAMINATE COMPOSITES PRODUCED BY CONTROLLED DIFFUSION BONDING Final Report, Jun. 1972 - Aug. 1973
Donald O. Cox and Alan S. Tetelman Oct. 1973 48 p refs
(Contract F33615-72-C-2096; AF Proj. 7381)
(AD-778093; AFML-TR-73-288) Avail: NTIS CSCL 11/6

An investigation of the use of laminate composites containing a weak interface to increase the fracture toughness of high strength titanium alloy has been conducted. Two billets were fabricated from 0.010 inch Ti-6Al-4V material using a diffusion bonding process. Thin metal foils were used as interleaf materials. Results indicate that the use of a 0.0015 inch Al foil as an interleaf leads to delamination ahead of the crack tip in the arrester orientation, and effectively blunts the crack. It was found that a 0.001 inch commercially pure titanium foil used as an interleaf will not lead to delamination and splitting. Diffusion during the bonding process causes formation of a uniform material with no weak interface. Therefore, no delamination or splitting could occur in the composite material. It was also found that a propagating fatigue crack can be arrested at the interface in the arrester orientation. It was also determined that the crack growth rates of material which splits in the divider orientation are similar to rates obtained from full strength material. (Modified author abstract) GRA

N74-27980# Illinois Univ., Urbana. Dept. of Theoretical and Applied Mechanics.
A HISTORY DEPENDENT PARAMETER FOR THE CYCLIC STRESS-STRAIN BEHAVIOR OF METALS
H. R. Jhansale Mar. 1974 58 p refs
(Grant DAHC15-72-G10; DAHC15-73-G7)
(AD-778357; T/AM-383; UILU-ENG-74-6005) Avail: NTIS CSCL 11/6

Transient and steady state stress-strain hysteresis behavior of several structural metals is analyzed. The study shows that a stress parameter, defined as the Yield Range Increment, uniquely denotes the various transient phenomena including cyclic hardening, softening, relaxation and creep and the steady state cyclic stress-strain behavior. All transient and steady state hysteresis branches of a given material appear to be identical in shape, after their Yield Range Increments which are suitable portions of the initial elastic parts are deleted. A mathematical model incorporating the Yield Range Increment is proposed. With the determination of the functional relationship between the newly proposed parameter and the several input variables of cyclic loading, this approach should lead to a simple and unified model for describing the cyclic stress-strain response of materials.
Author (GRA)

N74-27981# Naval Research Lab., Washington, D.C.
SOLUTION CHEMISTRY IN CREVICES ON Fe-Cr BINARY ALLOYS Final Report
F. D. Bogar and C. T. Fujii 21 Mar. 1974 16 p refs
(RR0220844)
(AD-778002; NRL-7690) Avail: NTIS CSCL 07/4

The major cation concentrations and pH's were measured in crevices on Fe-Cr alloys under potentiostatic conditions in the laboratory and on larger commercial steel specimens freely corroding in natural seawater. Crevice solutions were analyzed by thin-layer chromatography. The ratio of the cations in the crevice solutions was not equal to the ratio of the metals in the alloys; the ionic concentrations in the crevice solutions were determined, to a very large extent, by transport phenomena between the crevice and bulk solutions. (Modified author abstract) GRA

N74-27982# Philco-Ford Corp., Newport Beach, Calif. Aeronutronic Div.
DEVELOPMENT OF CORROSION RESISTANT, HIGH STRENGTH STEELS Final Report, 22 Jan. 1973 - 22 Feb. 1974
M. J. Harrigan and T. J. Koppenaal 22 Feb. 1974 33 p refs
(Contract N62269-73-C-0324)
(AD-778017) Avail: NTIS CSCL 11/6

A program was conducted to develop a high chromium TRIP steel that would exhibit high strength and ductility and good general and stress corrosion resistance. The steel was to be capable of being strengthened via the process of thermally cycling between martensite and reverted austenite. A total of 26 different alloys were evaluated. None of the alloys responded satisfactorily to the thermal cycling technique. (Modified author abstract) GRA

N74-27983# British Steel Corp., Sheffield (England). Information Services.
A CRITICAL EVALUATION OF METHODS FOR THE DETERMINATION OF FREE NITROGEN IN CARBON AND LOW ALLOY STEELS Research Report
R. Fisher and G. White Dec. 1973 14 p refs
(PB-226979/3; CAPL/SM/G/51-73) Avail: NTIS HC $4.00 CSCL 11F

Two procedures for the determination of free nitrogen in carbon and low alloy steel were evaluated. One is a thermal technique in which free nitrogen is extracted in a stream of hydrogen to form ammonia, which is determined either by titration or colorimetrically. The second is a difference procedure in which combined nitrogen is separated and determined. Free nitrogen is then obtained by subtracting this value from the total nitrogen content. The experimental parameters of each technique were defined and potential sources of error were investigated. The free nitrogen contents of a range of experimental alloys and steels were determined by each technique and the results compared. With certain exceptions, the thermal procedure is the most precise and probably the most accurate technique available. GRA

N74-27984# British Steel Corp., Sheffield (England). Information Services.

SOME OBSERVATIONS ON THE STRUCTURES AND TEXTURES OF LOW CARBON STEELS CONTAINING NIOBIUM

R. Gillanders and C. Dasarathy Dec. 1973 12 p refs
(PB-226978/5; SM/690/A) Avail: NTIS HC $4.00 CSCL 11F

Investigations on two experimental vacuum degassed, works hot rolled low carbon niobium bearing (0.07 and 0.12 Wt %) steels have shown that on cold rolling (by 60 and 80%) and box annealing in the laboratory, the annealed materials are characterised by sharp near (111) <112> type of texture and excellent values of average plastic strain ratio, R. Increasing the niobium content from 0.07 to 0.12% sharpened the annealed texture and led to an improvement in the R values. It is considered that the sharper annealed texture and higher R values in the 0.12% niobium steel are due to the formation of a special (112) <110> type of sharp hot rolled texture in this steel. It is regarded that the special sharp hot rolled is due to the influence of the niobium level on the recrystallisation of austenite during hot rolling. GRA

N74-27985# British Steel Corp., Sheffield (England). Information Services.

THE ANALYSIS OF MILD AND LOW ALLOY STEELS, USING THE UVAQ OPTICAL EMISSION SPECTROMETER

A. Tunney Dec. 1973 18 p
(PB-226976/9; GS/TECH/258/1/73/C) Avail: NTIS HC $4.00 CSCL 11F

An off-line computer program with calibration updating and data processing facilities has been described previously. The operation of ARL 29700B Optical Emission Spectrometer (UVAQ) in the Research Center in now based on this program and its performance for the analysis of C, Si, Mn, P, S, Cr, Mo, Ni, Al, B, Cu, Nb, Sn, Ti, V, and Zr in mild and low alloy steels was investigated. Performance of the vacuum spectrometer was found to be satisfactory but the performance of the air spectrometer is not up to expectation. On the basis of the results obtained, and after consultation with the manufactures, the analytical lines for Mn and Si are to be re-sited in the vacuum spectrometer. GRA

N74-27986# British Steel Corp., Sheffield (England). Information Services.

ASSESSMENT OF THE PHILLIPS PW 1450 X-RAY SPECTROMETER FOR STEEL ANALYSIS

H. Hughes and A. A. Tunney Dec. 1973 17 p
(PB-226975/1; GS/EX/43/73/C) Avail: NTIS HC $4.00 CSCL 11F

The performance of the PW 1450 in the analysis of low alloy steels was assessed. It was established that, using a ratio technique, counting statistics is the only factor which governs the precision achieved on 13 of the channels examined (Si, Mn, Cr, Mo, As, Co, Cu, Ni, Sb, Sn, V, W, and Zr). In the case of Ni and Ti other factors, most probably associated with sample preparation, deteriorate the precision which can be achieved. Data for P and S are also presented but a Mo overlap prohibits mathematical examination in the same way. Comprehensive data are presented of performance under the operative conditions used. GRA

N74-27987# British Steel Corp., Sheffield (England).

THE TENSILE PROPERTIES OF A FULLY AGED RIMMING STEEL AT HIGH STRAIN RATES

A. B. Haberfield and M. W. Boyles Dec. 1973 9 p refs
(PB-226974/4; SM/687/A) Avail: NTIS HC $4.00 CSCL 11F

Direct measurements of the changes in the stress strain behavior of a fully aged low carbon rimming steel as a function of applied strain rate over the range 0.00015 to 0.7/sec have shown that the yield stress and tensile strength increase with increasing strain rate according to a given equation. GRA

N74-27988# British Steel Corp., Sheffield (England). Information Services.

THE DETERMINATION OF CERIUM IN STEELS BY X-RAY FLOURESCENCE

A. A. Tunney Dec. 1973 9 p refs
(PB-226972/8; GS/EX/2/73/C) Avail: NTIS HC $4.00 CSCL 11F

The development of an X-ray fluorescence method for the analysis of cerium in steel is described. It is shown that an analysis time of 40 seconds yields the same precision (plus or minus 0.001% Ce) as the chemical method it is intended to replace and which takes approximately one hour per sample. Segregation within plate and cast samples has been studied in detail and has been found to be of the same order as the instrumental reproducibility. This is contrary to the experiences of previous workers and is a reflection of the progress made in the production of steels with rare earth additions. GRA

N74-27989# Rensselaer Polytechnic Inst., Troy, N.Y. Materials Div.

FATIGUE BEHAVIOR OF AN Ag3Mg-AgMg EUTECTIC COMPOSITE

Y. G. Kim, G. E. Maurer, and N. S. Stoloff 1 Apr. 1974 24 p refs
(Contract N00014-67-A-0117-0010; NR Proj. 031-745)
(AD-778356; TR-4) Avail: NTIS CSCL 11/6

High cycle fatigue properties of an aligned Ag3Mg-AgMg eutectic alloy have been determined at room temperature as a function of growth speed and the presence of long range order in the Ag3Mg phase. Fatigue life increased sharply with growth speed for ordered samples, particularly at low applied stress levels. Long range order also increased life relative to the disordered condition. Fractographic and metallographic examination revealed a change in the mechanism of fatigue crack growth with order. Author (GRA)

N74-27990# A.Q.D. Labs., Harefield (England).

AN IMPROVED FACILITY FOR THE CALIBRATION OF ALUMINUM ALLOY ULTRASONIC REFERENCE BLOCKS

I. Millman 1973 31 p refs
(AD-778256; AQD/NDT-1369) Avail: NTIS CSCL 11/6

The report describes an improved facility for the calibration of aluminum alloy ultrasonic reference blocks. The technique uses special equipment having a sensitivity greater than that previously obtainable. This has provided a better insight into the problems associated with ultrasonic block calibration. GRA

N74-27991# United Aircraft Corp., East Hartford, Conn. Research Labs.

EFFECT OF VANADIUM AND SODIUM COMPOUNDS ON ACCELERATED OXIDATION OF NICKEL-BASE ALLOYS Final Report, 1 Mar. 1970 - 31 Dec. 1973

N. S. Bornstein, M. A. Decrescente, and H. A. Roth Apr. 1974 107 p refs
(Contract N00014-70-C-0234; NR Proj. 036-089)
(AD-778335; UARL-N911648-1) Avail: NTIS CSCL 11/6

The oxidation of nickel-base alloys in the presence of gaseous and condensed alkali sulfates, alkali vanadates and vanadium pentoxide was studied. It was found that in the presence of condensed alkali sulfates, oxide ions present in the melt react with and render the normally protective oxide scale ineffectual. The corrosion associated with alkali sulfates can be controlled by the presence of compatible oxides which preferentially react with the oxide ions to form innocuous compounds. Vanadium pentoxide, like the alkali sulfates, accelerates the oxidation rate of nickel-base supperalloys. The product of the reaction between V2O5 and the substrates is dependent upon the alloying elements present in the alloy. In the absence of alloying elements such as aluminum and titanium, the products are vanadates. However, when the alloys contain aluminum and/or titanium, the product of the reaction appears to be a glass. The study is related to corrosion inhibitions in vanadium containing fuels in gas turbines. (Modified author abstract) GRA

N74-27992# Michigan Univ., Ann Arbor. Dept. of Mechanical Engineering.

INTERRUPTED JET WATER GUN IMPACT-EROSION STUDIES ON METALLIC ALLOYS

F. G. Hammitt, J. B. Hwang, and Linh N. Do Jan. 1974 17 p refs
(Grant NSF GK-1889)
(PB-228143/4; UMICH-01357-22-1) Avail: NTIS HC $4.00 CSCL 11F

An interrupted water jet gun capable of producing elongated

liquid slugs with diameter of about 1.0 mm, with velocities up to about 600 m/s and with repetition rate of about 40 slugs per minute has been used to measure the erosion resistance of various materials under this type of attack. The effects of velocity and angle of impingement in particular upon metallic materials are reported in this paper. (Modified author abstract) GRA

N74-27993# Naval Research Lab., Washington, D.C.
DETERMINATION OF FRACTURE-RESISTANCE VALUES USING THE CENTER-CRACKED TENSILE SPECIMEN
A. M. Sullivan and J. Stoop 3 Apr. 1974 24 p refs
(AD-777995; NRL-7674) Avail: NTIS CSCL 11/6

The results of a series of investigations at NRL are tabulated as guidelines for the use of the center-crack tensile specimen. These investigations will assist in the development of a standard test method for the determination of fracture resistance in terms of Kc, the linear-elastic fracture mechanics parameter for thin-sheet material. Some relationships are discussed which permit a simplification of testing procedures for screening purposes.
Author (GRA)

N74-27994# Naval Research Lab., Washington, D.C.
APPLICATION OF THE J INTEGRAL TO CRACK INITIATION IN A 2024-T35 ALUMINUM ALLOY
C. A. Griffis and G. R. Yoder 3 Apr. 1974 27 p refs
(AD-777999; NRL-7676) Avail: NTIS CSCL 11/6

The J integral has been successfully applied as a fracture initiation criterion for 2024-T351 aluminum alloy. A heat-tinting technique was used for quantitative measurement of crack extension at selected points on the load-deflection curve. In three-point bend tests incorporating six specimen configurations the critical J values (J(Ic)) at the onset of crack movement differ by at most 15 percent and yield a mean K(Ic) value of 30.9 plus or minus 1.2 ksi/(in. superscript 1/2). The relationship between instantaneous J value and crack extension is independent of initial crack length over the range of crack sizes investigated. J-integral values associated with maximum load (5 to 15 percent crack growth), unlike J(Ic), show a strong dependence on specimen thickness. Author (GRA)

N74-27995# California Univ., Los Angeles. School of Engineering and Applied Science.
MISCIBILITY GAP AND SPINODAL SURFACE OF TERNARY REGULAR SOLUTIONS Interim Report
M. Murakami, D. DeFontaine, and I. P. Scheer Jan. 1974 57 p refs
(Grant NSF GH-32577)
(PB-229336/3; UCLA-ENG-7407) Avail: NTIS HC $6.00 CSCL 11F

Isothermal miscibility gap (MIGP) and spinodal (SPNDL) curves of ternary metallic systems were calculated by making use of the Newton-Raphson iteration technique applied to Meijering's method of calculation. The use of the Cook and Milliard relation between MIGP and SPNDL points allowed the determination of the starting values for the Newton-Raphson iteration without requiring any guesswork. This makes it possible to calculate MIGP and SPNDL isothermal curves of ternary systems for every one of Meijering's eight categories simply by using pair interaction parameters and temperatures as input data.
GRA

N74-27996# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A SCANNING AUGER MICROSCOPE FOR THIN FILM ANALYSIS M.S. Thesis
James Martin Kroyer Dec. 1973 75 p refs
(AD-777849; GE/EE/73A-16) Avail: NTIS CSCL 07/4

A scanning Auger microscope was assembled by a previous Air Force Institute of Technology student at the Air Force Avionics Laboratory for spectroscopic analysis of thin films. Previous attempts to operate the system for Auger analysis were incomplete. Modifications were made to the system so Auger analysis could be made on a fixed point. Sputtering facilities were designed and added to the system to provide cleaning and indepth profile capabilities. Problems encountered in obtaining a surface scanned Auger peak presentation were identified and correlated with the overall present sensitivity of the system.
Author (GRA)

N74-28006* Scientific Translation Service, Santa Barbara, Calif.
SERVICE LIFE OF METALS AT LOW TEMPERATURES
B. I. Verkin, I. M. Lyubarskiy, N. M. Grinberg, and L. F. Yakovenko *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 19-34 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 14-22 (For availability see N74-28003 17-18)
CSCL 11F

N74-28008* Scientific Translation Service, Santa Barbara, Calif.
FATIGUE LIFE OF METALS UNDER CYCLIC LOADING IN VACUUM
B. I. Verkin, I. M. Lyubarskiy, V. M. Boychuk, N. M. Grinberg, and A. I. Alekseyev *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 45-64 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 28-37 (For availability see N74-28003 17-18)
CSCL 11F

N74-28010* Scientific Translation Service, Santa Barbara, Calif.
INFLUENCE OF DEGREE OF AMBIENT MEDIUM RAREFACTION ON DEFORMATION OF COPPER AND ALUMINUM
I. M. Lyubarskiy, A. A. Guslyakov, A. V. Ashukin, and V. I. Kuleba *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 76-82 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 44-46 (For availability see N74-28003 17-18)
CSCL 11F

N74-28011* Scientific Translation Service, Santa Barbara, Calif.
FRICTION AND WEAR CHARACTERISTICS OF CARBON STEELS IN VACUUM
B. I. Verkin, I. M. Lyubarskiy, V. F. Udovenko, and A. A. Guslyakov *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 83-87 Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 47-49 (For availability see N74-28003 17-18)
CSCL 11F

N74-28377* Kanner (Leo) Associates, Redwood City, Calif.
OBSERVATIONS ON SOME ACOUSTIC METHODS USED IN STUDYING THE ELASTIC PROPERTIES OF METALS
Constantin Ioan Velceanu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 85-92 refs Transl. into ENGLISH from A. 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 119-124 (For availability see N74-28363 17-32)
CSCL 11F

18 MATERIALS, NONMETALLIC

Includes corrosion; physical and mechanical properties of materials (e.g., plastics); and elastomers, hydraulic fluids, etc. For basic research see: 06 Chemistry. For related information see also: 17 Materials, Metallic; 27 Propellants; and 32 Structural Mechanics.

N74-27997 Kansas Univ., Lawrence.
FRACTURE AND FATIGUE PROPERTIES OF A THREE-DIMENSIONAL COMPOSITE MATERIAL Ph.D. Thesis
Kuang-Hsiu Lu 1973 145 p
Avail: Univ. Mcrofilms Order No. 74-12594

A three-dimensional composite material was fabricated and fracture mechanics techniques were used to investigate the fracture and fatigue characteristics. Basic mechanical properties tests were conducted as well as the fracture and fatigue behavior. Stress intensity factors and rate of crack propagation were obtained by experiments. Various theories of failure of this material were also discussed and several examples of the use of the above properties were presented. In general, the results

show that the fracture mechanics approach can be applied successfully to study the fracture and fatigue characteristics of a three-dimensional composite material. Dissert. Abstr.

N74-27998 Wisconsin Univ., Madison.
THE MECHANICAL AND OPTICAL CHARACTERIZATION OF A MICROSPHERE FILLED COMPOSITE Ph.D. Thesis
Terry Gordon Richard 1973 132 p
Avail: Univ. Microfilms Order No. 74-7491

An attempt was made to produce a homogeneous, isotropic solid with variable mechanical properties and which was suitable for photoelastic investigations. This goal is accomplished through the fabrication of a discontinuous composite, where the birefringent constituents have matched indices of refraction. The constituents of this composite are solid glass microspheres embedded in a polyester matrix. Four theories of mechanical property prediction are reviewed. Experimental data for Poisson's ratio and elastic modulus are presented and compared to the theories for a range of different glass contents. Three theories are formulated to define the stress induced birefringent phenomena found in composites of this nature. Conventional photoelastic and holographic techniques were employed to produce appropriate data to compare with the predictions of these theories. An additional analytical and experimental investigation of the response of a layered deep beam is presented. Dissert. Abstr.

N74-27999 Rensselaer Polytechnic Inst., Troy, N.Y.
THE RELATIONSHIPS OF STRUCTURE TO PROPERTIES IN CARBON FIBERS Ph.D. Thesis
Edward William Tokarsky 1973 463 p
Avail: Univ. Microfilms Order No. 74-12799

The tensile moduli of carbon fibers are related to details of axial preferred orientation, while strength will be a function not only of axial, but radial (cross sectional) texturing as well, and the presence of flaws. Carbon fibers studied were of polyacrylonitrile (Courtelle, Orlon, and experimental), Rayon and polyacetylene bases, and spanned a modulus range of 6-116 Msi. The basic structural unit in all carbon fibers resembles a sinusoidal-like rippled ribbon or sheet. In very low modulus materials, the ribbons have a high amplitude to wave length ratio, are twisted and tangled, but relatively continuous. With increasing modulus, the ribbons become less tangled and twisted, the number of basal layers in each ribbon increases, the amplitude to wave length ratio drops, and the lateral dimensions increase. Further increases in modulus are accompanied by lateral growth to give a sheet type morphology and/or increased crystallinity.
Dissert. Abstr.

N74-28000 Stanford Univ., Calif.
PHOTOEMISSION STUDIES OF CADMIUM SULPHIDE, ZINC OXIDE, TELLURIUM AND CESIUM TELLURIDE Ph.D. Thesis
Ronald Allan Powell 1974 153 p
Avail: Univ. Microfilms Order No. 74-13676

Photoemission studies were used to investigate the electronic structure of vacuum cleaved wurtzite CdS, ZnO, and evaporated, films of CsTe. for CdS, measurements were made with the incident ultraviolet radiation polarized perpendicular and parallel to the c-axis. Photoemitted electrons (EDC) indicate that photoelectric threshold in CdS is determined by the band structure and density of states as well as the electron escape probability. In the case of ZnO, features of the density of states were deduced from the EDC's. It was suggested that transitions from the d-states compete with transitions from the upper VB states and give rise to the peculiar shape of the UV reflectivity spectrum for ZnO. The photoemission spectra of amorphous and polycrystalline Te films were similar with two broad peaks in the VBDOS. Cesium telluride studies demonstrate the effect that electron-electron scattering and electron-phonon scattering have on photoemission data. Dissert. Abstr.

N74-28001 Columbia Univ., New York.
LASER-INDUCED FLUORESCENCE AND THERMAL LENSING STUDIES OF VIBRATIONAL RELAXATION IN CD4, SO2 AND OCS
Donald Robert Siebert 1973 151 p
Avail: Univ. Microfilms Order No. 74-12764

Laser-induced infrared fluorescence and time-resolved thermal lensing studies have been performed on CD4, SO2 and OCS. A wide variation in the efficiency of vibrational energy transfer (V-V) processes is observed. These variations are discussed in light of existing theories of V-V energy transfer and demonstrate the relative effects which parameters such as non-resonance, multiple-quantum exchange and Fermi interactions may have on the efficiency of collisional energy transfer processes. The equilibration of the vibrational manifold with the translational and/or rotational degrees of freedom is also observed in these studies. Dissert. Abstr.

N74-28002 Maryland Univ., College Park.
APPLICATIONS OF X-RAY PHOTOELECTRON SPECTROSCOPY TO THE STUDY OF INORGANIC AND ORGANOMETALLIC COMPLEXES OF NICKEL, PALLADIUM, PLATINUM AND MOLYBDENUM, PART 1. THE SYNTHESIS AND CHARACTERIZATION OF SOME NOVEL POLYDENTATE PHOSPHORUS-NITROGEN LIGANDS, PART 2 Ph.D. Thesis
Luis J. Matienzo 1973 204 p
Avail: Univ. Microfilms Order No. 74-12824

About 150 inorganic and organometallic complexes of nickel, palladium, platinum, and molybdenum have been studied systematically by X-ray photoelectron spectroscopy in order to appraise the applicability of the novel technique to such chemical problems. Data obtained by this technique on about 70 nickel compounds indicate that binding energy alone is insufficient in the determination of the oxidation state of a metal ion. A plot of metal 2p binding energies against calculated charge in a series of nickel(II) compounds reveals a variation of 4.3 eV in this oxidation state when ligands of different electronegativities are situated around the metal ion. The successful extension of the Mannich condensation reaction to ethylenediamine and its alkylated derivatives has provided a fairly simple method for the preparation of several new phosphorus-nitrogen compounds. These potential polydentate ligands have been of considerable interest because they contain two atoms of different basicity and thus may yield a variety of coordination compounds. Dissert. Abstr.

N74-28003*# Scientific Translation Service, Santa Barbara, Calif.
SPACE STUDIES IN THE UKRAINE. NUMBER 1: SPACE MATERIALS STUDIES AND TECHNOLOGY
G. S. Pisarenko Washington NASA Jun. 1974 209 p refs Transl. into ENGLISH of the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 104 p
(Contract NASw-2483)
(NASA-TT-F-15535) Avail: NTIS HC $13.50 CSCL 11D

The results are presented of studies of the physical and mechanical properties of constructional materials in vacuum at low and high temperatures. The peculiarities of the processes of friction and wear and metal failure, under short-term static and long-term alternating loads in conditions similar to those of space, are examined. Equipment is described which makes it possible to carry out the technological operations of metal melting welding, brazing, and vacuum deposition under conditions simulating space. The problems of unsteady heat transport and heat transfer for bodies of different shape in space are solved. For individual titles, see N74-28004 through N74-28019.

N74-28004* Scientific Translation Service, Santa Barbara, Calif. c11
STAND FOR STUDYING TECHNOLOGICAL PROCESSES UNDER CONDITIONS SIMULATING SPACE
B. Ye. Paton, V. Ye. Paton, D. A. Dudko, V. N. Bernadskiy, G. P. Dubenko, V. F. Lapchinskiy, V. V. Stesin, A. A. Zagrebelnyy, Yu. N. Lankin, Yu. A. Masalov et al *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 1-8 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 5-9 (For availability see N74-28003 17-18)
CSCL 14B

A test stand for conducting processing experiments under conditions simulating space is described. The most important units of the stand are discussed. Tests of the stand and research studies using the stand demonstrated that it is a reliable and universal research facility which makes it possible to study

processes such as metal melting, welding, and deposition.
Author

N74-28005* Scientific Translation Service, Santa Barbara, Calif.
STUDY OF THE POSSIBILITY OF USING SOLAR RADIANT ENERGY FOR WELDING AND BRAZING METALS **c15**
V. S. Dvernyakov, I. N. Frantsevich, V. V. Pasichnyy, N. A. Shiganov, Yu. I. Korunov, and I. Ye. Kasich-Pilipenko *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 9-18 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 9-14 (For availability see N74-28003 17-18)
CSCL 13H

The solar spectrum at the surface of the earth is analyzed. A facility for creating concentrated solar radiant energy flux is described, and data on its energetic capabilities are presented. The technology of solar welding by the fusion technique and joining by high-temperature brazing is examined. The use of concentrated solar radiant energy for welding and brazing metals and alloys is shown. The results of mechanical tests and microscopic and macroscopic studies are presented. Author

N74-28006* Scientific Translation Service, Santa Barbara, Calif.
SERVICE LIFE OF METALS AT LOW TEMPERATURES **c17**
B. I. Verkin, I. M. Lyubarskiy, N. M. Grinberg, and L. F. Yakovenko *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 19-34 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 14-22 (For availability see N74-28003 17-18)
CSCL 11F

Current concepts of the nature of fatigue failure at low temperatures are presented on the basis of experimental results of various investigators. The fundamental approach to the technique for studying low-temperature fatigue is examined. The necessity for using the same medium at different fatigue test temperatures and also the necessity for taking into account the magnitude of the plastic deformation amplitude are confirmed. Experimental data from a study of the influence of low temperatures (down to liquid nitrogen temperatures) on the fatigue life of copper and armco-iron in dry air, over a wide range of deformations, are presented. These results are compared with microscopic and electron microscopic pictures of the surface of the deformed specimens. Author

N74-28007* Scientific Translation Service, Santa Barbara, Calif.
MAGNESIUM-LITHIUM CASTING ALLOYS
V. P. Latenko, T. V. Silchenko, V. A. Tikhonov, V. P. Maltsev, and V. P. Korablin *In its* Spaces Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 35-44 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 22-28 (For availability see N74-28003 17-18)
CSCL 11D

The strength properties of magnesium-lithium alloys at room, low, and high temperatures are investigated. It is found that the alloys may have practical application at ambient temperatures up to 100 C, that negative temperatures have a favorable influence on the alloy strength, and that cyclic temperature variations have practically no effect on the strength characteristics. The influence of chemical coatings on corrosion resistance of the MgLi alloys is examined. Several facilities based on pressure casting machines, low-pressure casting machines, and magnetodynamic pumps were designed for producing MgLi alloy castings. Results were obtained for MgLi alloys reinforced with fibers having a volumetric content of 15%. Author

N74-28008* Scientific Translation Service, Santa Barbara, Calif.
FATIGUE LIFE OF METALS UNDER CYCLIC LOADING IN VACUUM **c17**
B. I. Verkin, I. M. Lyubarskiy, V. M. Boychuk, N. M. Grinberg, and A. I. Alekseyev *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 45-64 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 28-37 (For availability see N74-28003 17-18)
CSCL 11F

The effect of vacuum on the cyclic strength of metals is examined. Experimental data are presented of studies to clarify the mechanism of vacuum influence on fatigue failure. The dependence of copper and armco-iron fatigue life on vacuum level is studied. It is found that the presence of saturation on the curve of fatigue life versus vacuum level is common for the materials studied. The effect of vacuum on fatigue fracture of copper is studied over a wide range of deformations. It is shown that fatigue life increase under vacuum conditions and the observed characteristics of the fatigue fracture itself in vacuum are associated with homogenization of the plastic deformation under these conditions. Author

N74-28009* Scientific Translation Service, Santa Barbara, Calif.
INFLUENCE OF LOW TEMPERATURES OF FRICTION AND WEAR **c15**
V. F. Udovenko and G. N. Presnyakova *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 65-75 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 38-43 (For availability see N74-28003 17-18)
CSCL 11H

A brief review of studies on low-temperature friction are briefly reviewed. A facility and technique for studying friction both in air and in vacuum at temperatures of +20 and -190 C is described. Results of a wear study of structural steels operating together with chromium steel are presented. It is shown that reduction of the test temperature in vacuum leads in certain cases to marked increase of the wear magnitude and friction coefficient. This is associated not only with the general change of the mechanical properties of the materials but also with the influence of temperature reduction on the hardening and structural formation taking place in the surface layers during friction. Author

N74-28010* Scientific Translation Service, Santa Barbara, Calif.
INFLUENCE OF DEGREE OF AMBIENT MEDIUM RAREFACTION ON DEFORMATION OF COPPER AND ALUMINUM **c17**
I. M. Lyubarskiy, A. A. Guslyakov, A. V. Ashukin, and V. I. Kuleba *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 76-82 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 44-46 (For availability see N74-28003 17-18)
CSCL 11F

The influence of high vacuum 1 x 10 to the minus 9th power torr on the plastic deformation of copper and aluminum was studied. When stretching polycrystalline aluminum and copper specimens in vacuum, it was found that the deformation at failure increases and the ultimate strength decreases. Deformation in vacuum is accompanied by the evolution of hydrogen. For copper, gas evolution is observed only at failure, while for aluminum hydrogen evolution takes place in the initial stage and the gas evolution peaks correspond to small steps on the deformation curve. Author

N74-28011* Scientific Translation Service, Santa Barbara, Calif.
FRICTION AND WEAR CHARACTERISTICS OF CARBON STEELS IN VACUUM **c17**
B. I. Verkin, I. M. Lyubarskiy, V. F. Udovenko, and A. A. Guslyakov *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 83-87 Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 47-49 (For availability see N74-28003 17-18)
CSCL 11F

The nature of carbon steel friction and wear under vacuum conditions is described within the framework of general friction and wear theory. Friction is considered a dynamic process and wear is considered to be the result of a continuous sequence of transitions of the friction surface material from one state into another. Author

N74-28012* Scientific Translation Service, Santa Barbara, Calif.
THERMAL REGIME AND TEMPERATURE STRESSES IN BODIES DURING THERMORADIATIONAL HEATING c33
N. V. Chistopyanova and V. L. Chumakov *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 88-98 refs Transl. into ENGLISH from the book" Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 49-54 (For availability see N74-28003 17-18)
CSCL 20M

An approach is developed to the application of the perturbation method for the solution of problems with essential external nonlinearities, based on identification in the boundary condition of a small nonlinear complex which is considered a perturbing function. The solutions obtained in the first approximation with error of 1 to 2% in calculating the unsteady temperature fields are then used to determine the temperature stresses and deformations in solid bodies of classical form. Author

N74-28013* Scientific Translation Service, Santa Barbara, Calif.
EFFECTIVENESS OF SOLID LUBRICANT COATINGS FOR FRICTION IN HARD VACUUM (10-9 tor) c15
B. I. Verkin, I. M. Lyubraskiy, V. F. Udovenko, and L. N. Sentyurikhina *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 99-112 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 54-60 (For availability see N74-28003 17-18)
CSCL 11H

A study was made of the efficiency of solid lubricating coatings, based on MoS2 with various binders, during friction and under highvacuum conditions. Mass spectrometry was used for an analysis of the composition of the gas evolved from the coatings in the friction process. It is shown that the vacuum level, loading, and sliding velocity influence coating effectiveness. In the friction process the solid lubricant coatings yield characteristic decay products associated with the chemical nature of the binders. The mechanism of coating breakdown during friction is associated with the binder breakdown mechanism. Author

N74-28014* Scientific Translation Service, Santa Barbara, Calif.
TRANSIENT COOLING OF SOLID BODIES OF CLASSICAL FORM BY RADIATION c33
V. S. Novikov and V. L. Chumakov *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 113-120 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 60-63 (For availability see N74-28003 17-18)
CSCL 20N

An approximate analytic method is presented for analysis of the unsteady process of radiative cooling of solid bodies of classical form. The nonlinear heat transfer problem is solved by the cascade linearization technique with use of the iteration method. Comparison of the results obtained even in the first approximation with the available numerical solutions indicates adequate engineering accuracy of the proposed technique. Author

N74-28015* Scientific Translation Service, Santa Barbara, Calif.
THERMOCAPILLARY CONVECTION IN WEIGHTLESS CONDITION c33
V. G. Babskiy, I. L. Sklovskaya, and Yu. B. Sklovskiy *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 121-130 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 63-68 (For availability see N74-28003 17-18)
CSCL 20M

Results are presented of studies on thermocapillary instability of a liquid in a spherical layer with free surface and convection in a rectangular channel with horizontal temperature gradient. It is shown that in vessels partly filled with a viscous incompressible fluid and under essentially weightless conditions free convection may arise due to the surface tension temperature dependence. Author

N74-28016* Scientific Translation Service, Santa Barbara, Calif.
HEAT TRANSFER WITH NUCLEATE BOILING OF LIQUIDS UNDER WEAK MASS FORCE FIELD CONDITIONS c33
Yu. A. Kirichenko *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 131-159 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 68-81 (For availability see N74-28003 17-18)
CSCL 20M

The motion is examined of a vapor bubble growing and rising from a flat horizontal heater in the ideal fluid approximation and taking drag into account. Estimates are given of bubble lifetime, bubble radius at detachment, bubble detachment frequency, and time for the bubble to attain a constant rate of rise. The relations obtained for the microcharacteristics of the boiling process are used to determine the coefficients of heat transfer in developed nucleate boiling. A new form of the equations for describing heat transfer in nucleate boiling in dimensionless parameters is proposed. Author

N74-28017* Scientific Translation Service, Santa Barbara, Calif.
RADIATIVE COOLING OF BODIES OF ARBITRARY SHAPE AND VARIABLE VOLUME IN VACUUM c33
V. S. Novikov and V. L. Chumakov *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 160-168 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 82-85 (For availability see N74-28003 17-18)
CSCL 20M

On the basis of joint application of the Tolubinskii integral method and the perturbation method, the asymptotic unsteady temperature distribution is constructed for a region of arbitrary shape on the moving boundary of which there are located nonlinear heat sinks (sources), describing radiative cooling in a medium with zero temperature (in a vacuum). Author

N74-28018* Scientific Translation Service, Santa Barbara, Calif.
NONLINEAR UNSTEADY CONTACT HEAT CONDUCTION OF TWO-LAYER SHELLS IN THE PRESENCE OF THERMAL RADIATION c33
V. S. Novikov and V. L. Chumakov *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 169-177 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Nauko Dumka, 1973 p 86-90 (For availability see N74-28003 17-18)
CSCL 20M

A technique is proposed for calculating the complex heat transfer of mated shells with the surrounding medium which also takes into account the temperature dependence of the contact thermal resistance between the shells. This technique can be used for thermal calculations and for calculations of the temperature stresses in two-layer space structure shells. Author

N74-28019* Scientific Translation Service, Santa Barbara, Calif.
CALCULATION OF THE HYDRODYNAMIC AND HEAT TRANSFER PROCESSES OCCURRING DURING FILLING, PRESSURIZING, AND EMPTYING OF CRYOGENIC VESSELS c33
I. S. Zhitomirskiy and V. I. Pestryakov *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 178-198 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 90-99 (For availability see N74-28003 17-18)
CSCL 20M

A method is proposed for calculating the heat transfer and hydrodynamic processes taking place during pressurization and pressure transfer of cryogenic fluids. It is assumed that the liquid and gas flow in the vessel takes place with velocities considerably less than the speed of sound. The finite difference method is used to solve the governing system of nonlinear partial differential equations. Programs in ALGOL-60 language are developed which can be used to calculate these processes on a digital computer. The results of some calculations are presented in comparison with experimental data. Author

N74-28020# Bureau of Mines, Grand Forks, N.Dak. Energy Research Lab.
TECHNOLOGY AND USE OF LIGNITE
Wayne R. Kube, comp. and James L. Elder, comp. 1972 145 p refs Presented at Bur. of Mines-Univ. of North Dakota Symp., Bismack, N. Dak., 12-13 May 1971
(BM-IC-8543) Avail: SOD HC $1.50 as C 128.27:8543

Utilization and technology of Western coal and lignites for power production is considered. For individual titles, see N74-28021 through N74-28032.

N74-28021 Bureau of Mines, Jackson, Miss.
A PROGRESS REPORT ON COAL MINE HEALTH AND SAFETY **c34**
Henry P. Wheeler, Jr. *In its* Technol. and Use of Lignite 1972 p 12-14 (For availability see N74-28020 17-18)

Progress in implementation of the Federal Coal Mine Health and Safety Act of 1969 is presented. Three major approaches are being followed: inspection and enforcement; research and development; and education and training. In the first year in excess of 3,000 coal mine inspections were conducted and over 52,000 notices of violation of standards and 2,800 withdrawal orders were issued. To fully implement the 40,000 inspections that will be required each year, sufficient personnel have been hired but their training will not be completed for a few months. Although physical conditions in underground mines have been improved, the fatality rate has not. Lack of improvement may be caused by new inexperienced workers, opening of new mines, less adequate supervision, and loss of experienced foremen who are training as mine inspectors. Author

N74-28022 Peabody Coal Co., St. Louis, Mo.
PIPELINE TRANSPORT OF LIQUID COAL **c34**
Jack J. Ellis and Pete Bacchetti *In* Bur. of Mines Technol. and Use of Lignite 1972 p 15-31 (For availability see N74-28020 17-18)

The 273-mile coal pipeline from Black Mesa, Ariz., to the Mohave generating station at Davis Dam, Nev., is described. Five million tons of coal are to be transported each year. Strip mined coal is reduced in size to minus one-eighth in and made into a 50-percent water slurry. Water is obtained from five wells, each over 3,500 ft deep. Four pumping stations are required to move the slurry through the 18-in pipeline. At the generating station, the slurry is dewatered, using centrifuges, to 25-percent moisture and fed to the pulverizers. Effluent from the centrifuges is clarified, the clear water is used in plant operations and the concentrated slurry returned to the centrifuge. No water is discharged as the excess is solar evaporated from holding ponds. Author

N74-28023 Bureau of Mines, Pittsburgh, Pa. Energy Research Center.
LIQUEFACTION OF LIGNITE WITH CARBON MONOXIDE AND WATER
Herbert R. Appell, Irving Wender, and Ronald D. Miller *In its* Technol. and Use of Lignite 1972 p 32-39 refs (For availability see N74-28020 17-18)

Lignite was treated with carbon monoxide and steam with the objective of preparing a low sulfur, heavy fuel oil. At temperatures of 380 to 400 C and pressures of 3,000 to 5,000 psig, conversions of about 90 percent of lignite and oil yields near 75 percent have been obtained. These conversions were obtained using freshly pulverized lignite, a solvent, and pressures above 4,000 psig. Under these conditions, the liquefaction of lignite required only 15 minutes at 380 to 400 C, exclusive of heating and cooling periods. Alkaline compounds which are present in lignite are good catalysts for the liquefaction reaction. In order to obtain high yields at pressures near 3,000 psig, it was necessary to increase the reaction time to about 2 hr and use larger quantities of a solvent fortified with a heterocyclic nitrogen base. At these conditions, mixtures of hydrogen and carbon monoxide worked almost as well as carbon monoxide. Author

N74-28024 Minnesota Power and Light Co., Duluth.
USE OF WESTERN COAL AND AIR WATER QUALITY CONTROL BY MINNESOTA POWER AND LIGHT COMPANY **c15**
E. F. McGuire and W. F. Arndt (Abe W. Mathews Eng. Co., Hibbing, Minn.) *In* Bur. of Mines Technol. and Use of Lignite 1972 p 40-48 (For availability see N74-28020 17-18)

Conversion of thermal generating stations to use of subbituminous coal is discussed. The major conversion requirement is for installation of increased pulverizer capacity. In some cases modification of the superheater section, addition of burners, and use of oil for peak load are required. Unloading and handling facilities are described. In order to meet the requirements set by pollution control, it is planned to install wet scrubbers. A spray chamber, low gas velocity scrubber was selected after a preliminary testing program. Indications are such a unit will have a high collection efficiency for particulates and allow control of effluents to meet water quality standards. Required modification to existing thermal units are given. Author

N74-28025 Environmental Protection Agency, Washington, D.C. Div. of Laboratory Operations.
RELATIONSHIP OF AIR QUALITY MEASUREMENTS TO CRITERIA AND EMISSION STANDARDS **c20**
Ronald E. Engel and Delbert S. Barth *In* Bur. of Mines Technol. and Use of Lignite 1972 p 49-55 refs (For availability see N74-28020 17-18)

Criteria and control technique standards are considered for those air pollutants that have an adverse effect on public health and welfare and the presence of which in the ambient air results from numerous or diverse mobile or stationary sources. Author

N74-28026 Environmental Protection Agency, Research Triangle Park, N.C. Development Engineering Branch.
NITROGEN OXIDES, SULFUR OXIDES, AND PARTICULATE CONTROL TECHNOLOGY FOR FOSSIL FUEL COMBUSTION **c20**
R. E. Harrington *In* Bur. of Mines Technol. and Use of Lignite 1972 p 56-69 refs (For availability see N74-28020 17-18)

Five methods for reduction of SO2 in air are classified as first generation processes and are discussed in some detail. These are: (1) Use of low-sulfur fuel; (2) dry limestone injection; (3) lime/limestone scrubbing; (4) magnesium scrubbing; and (5) catalytic oxidation. Limitation of first generation processes require development of improved second generation processes. Reduction in NO sub x emissions is at present limited to methods that lower flame temperatures. Particulate control in the utility industry has generally been by electrostatic precipitation with only moderate success. To achieve sufficiently high removal efficiency, the size and subsequent cost of the precipitator increases rapidly. Fabric filters may prove to be satisfactory substitues. The application of wet scrubbers for control of both particulate and SO2 needs additional development. Author

N74-28027 Montana Power Co., Butte.
LOW GAS TEMPERATURE SOLUTION TO HIGH RESISTIVITY ASH PROBLEMS **c33**
D. T. Berube *In* Bur. of Mines Technol. and Use of Lignite 1972 p 70-82 ref (For availability see N74-28020 17-18)

Efforts to improve the performance of an installed electrostatic precipitator by lowering the temperature of flue gas are presented. Fly ash from the low sulfur subbituminous coal has a high electrical resistivity and the precipitator efficiency was about 85 percent compared to the design efficiency of 97 percent. Laboratory and in situ measurements of ash resistivity indicated a reduction in resistivity at lower ges temperature. Gas temperature was lowered by air dumping and increasing the area of the economizer. In addition a mixing baffle was installed at the air heater outlet and two transformer rectifier sets were installed on the precipitator. Author

N74-28028 Joy Mfg. Co., Los Angeles, Calif. Western Precipitation Div.
COLLECTING FLY ASH FROM WESTERN LOW SULFUR COALS **c15**
James L. Ma *In* Bur. of Mines Technol. and Use of Lignite 1972 p 83-97 refs (For availability see N74-28020 17-18)

Two types of wet scrubbers were tested on a flue gas stream from a utility boiler. One was a flooded variable throat venturi unit and the other a direct impingement type. Both were effective in removing fly ash with the variable throat unit slightly more

efficient. Either can be considered as a practical alternate to the electrostatic precipitator. Efficiency increases with pressure drop through the unit. Both liquid recirculation and bleed-off rates effect efficiency to a lesser extent. A flowsheet of a proposed unit for a full size power plant is presented. Author

N74-28029 Joy Mfg. Co., Los Angeles, Calif.
PILOT STUDY OF ELECTROSTATIC PRECIPITATION FOR REMOVING FLY ASH AT BASIN ELECTRIC'S LELAND OLDS STATION c15
Kent E. Janssen (Basin Elec. Power Coop., Stanton, N. Dak.) and Floyd W. Redman *In* Bur. of Mines Technol. and Use of Lignite 1972 p 98-104 ref (For availability see N74-28020 17-18)

A pilot scale electrostatic precipitator was used to remove fly ash from a side stream of flue gas originating from an operating power plant. The electrical generating station burns low sulfur pulverized lignite. Under test conditions, 99-percent removal of fly ash was achieved, indicating suitability of this method for practical and effective removal of high resistivity lignite fly ash from boiler exit gases. The power input has a significant effect on precipitator performance with a marked decrease in efficiency below 80 percent of maximum power. Within the range tested, face velocity of gases was not a factor. Rappers were operated at high impact intensity and relatively high frequency to obtain adequate cleaning. Author

N74-28030 American Petroleum Inst., New York.
FUTURE ENERGY SUPPLY: APPROACHES AND OPTIONS c03
Wilson M. Laird *In* Bur. of Mines Technol. and Use of Lignite 1972 p 105-111 (For availability see N74-28020 17-18)

Domestic gas and oil deliverability should reach a peak about 1974. Use of coal will be severely restricted by air quality standards. At present the only method to fill the energy gap is by increased imports of foreign oil. If no action is taken, the nation will be dependent for a major share of its energy supply upon sources over which there can be little control. If such dependence is the result of a conscious, studied policy decision with full understanding of the consequences, the situation may be acceptable. A national energy policy should be formulated with a clear understanding of all facets including environmental considerations. An organization for formulating and articulating the policy is necessary. A strong team effort of government and industry is important to integrate and activate a national energy policy. Author

N74-28031 Minnkota Power Cooperative, Inc., Grand Forks, N. Dak.
LIGNITE AND THE CYCLONE BURNER IN A NEW 235-mw GENERATING STATION c11
Lloyd Hillier and B. W. Rudiger (Sanderson and Porter, New York) *In* Bur. of Mines Technol. and Use of Lignite 1972 p 112-126 (For availability see N74-28020 17-18)

Major operational systems are described with the most significant departure from the conventional lignite-fired boiler being the use of cyclone burners. The cyclone burners have performed well and only minimal startup difficulties were encountered. No fireside tube fouling has been experienced. Peak power production has reached 274 mw and was limited by the capacity of the boiler feedwater pump. Use of 1/4- by 0-in crushed lignite rather than pulverized lignite has eliminated pulverization problems. Some drying of lignite during crushing was necessary to maintain temperature levels in the cyclone sufficiently high to melt the lignite ash. Lignite was mined at an adjacent strip pit, trucked to the station and crushed. A mechanized lignite handling system conveyed the lignite to plant silos or storage. Cooling water was available from a nearby lake. Author

N74-28032 Minnkota Power Cooperative, Inc., Grand Forks, N. Dak.
DETAILED CONSTRUCTION AND EQUIPMENT COSTS FOR THE 235- mW MILTON R. YOUNG GENERATING STATION c11
Kenneth S. Vig *In* Bur. of Mines Technol. and Use of Lignite 1972 p 127-145 (For availability see N74-28020 17-18)

A total of $38,710,211 was required for equipment and construction of the 235 mw lignite fired, cyclone burner unit. This total included all items such as land, structures, roads, a dam to impound cooling water, mechanical and electrical equipment, lignite handling facilities, transformer and switchboard, engineering, overhead, interest, and inventory as well as the generating unit. Arranged in categories, costs are given in sufficient detail, including the year incurred, so that more accurate estimates can be made in planning new units. Author

N74-28033# Defence Standards Labs., Maribyrnong (Australia).
WASHING EXPOSURE TRAILS OF POLYETHYLENE AND POLY (VINYL CHLORIDE)
M. P. Bladen and E. J. Hill Nov. 1973 16 p refs
(TN-326) Avail: NTIS HC $4.00

Experiments were carried out to determine the effects, if any, of regular washing of exposed samples of polyethylene and PVC sheet. It was shown that washing, either by rain or regularly by hand over an eighteen month period does not wash away or leach out any detectable amounts of either plasticiser of degradation products from these materials. Neither does there seem to be any detectable physical damage done to the polymer by hand washing. Author

N74-28034# Defence Standards Labs., Maribyrnong (Australia).
THE EFFECT OF TROPICAL CONDITIONS ON OPTICAL GLASSES AND CEMENTS
R. A. Stokes and L. G. Moore Nov. 1973 18 p refs
(Rept-576) Avail: NTIS HC $4.00

In an attempt to discover which of the commonly used optical materials, if any, showed significant resistance or susceptibility to fungal attack under tropical conditions, a number of glasses and optical cements were exposed to jungle conditions for a period of six months. When returned the samples were examined for fungal attack, cleaned and re-examined for damage caused by the attack. The results of these examinations were analysed by means of an analysis of variance technique. Author

N74-28035*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio..
DESIGN AND EVALUATION OF EXPERIMENTAL CERAMIC AUTOMOBILE THERMAL REACTORS
Phillip L. Stone and Charles P. Blankenship Washington Jul. 1974 28 p refs
(NASA-TN-D-7706; E-7175) Avail: NTIS HC $3.25 CSCL 11B

The results obtained in an exploratory evaluation of ceramics for automobile thermal reactors are summarized. Candidate ceramic materials were evaluated in several reactor designs by using both engine-dynamometer and vehicle road tests. Silicon carbide contained in a corrugated-metal support structure exhibited the best performance, lasting 1100 hr in engine-dynamometer tests and more than 38,600 km (24000 miles) in vehicle road tests. Although reactors containing glass-ceramic components did not perform as well as those containing silicon carbide, the glass-ceramics still offer good potential for reactor use with improved reactor designs. Author

N74-28036*# National Materials Advisory Board, Washington, D.C.
PROCEEDINGS OF THE WORKSHOP ON STRUCTURAL COMPOSITES AND NONDESTRUCTIVE EVALUATION
Jun 1974 83 p refs Workshop held at Dayton, Ohio, 13-14 Feb. 1974 Sponsored in part by NASA
(Contract DA49-083-OSA-3131)
(NASA-CR-138822; NMAB-316) Avail: NTIS HC $7.25 CSCL 11D

The problems and opportunities in the nondestructive evaluation of composites are covered in formal papers and a summary of the discussion which took place at a Workshop held in Dayton on February 13-14, 1974. The recommendations arrived at by an NMAB Committee, on flaw detection, composite strength, standardization and design information, and research on composite degradation are stated. Author

N74-28037# Utah Univ., Salt Lake City. Div. of Materials Science and Engineering.
IMPURITY EFFECTS ON THE CREEP OF POLYCRYSTALLINE MAGNESIUM AND ALUMINUM OXIDES AT ELEVATED

TEMPERATURES Technical Progress Report, 19 Dec. 1972 - 18 Dec. 1973
R. S. Gordon 1973 28 p refs
(Contract AT(11-1)-1591)
(COO-1591-24) Avail: NTIS HC $3.00

Nabarro-Herring creep was conclusively identified as the mechanism for the creep in oxygen of polycrystalline MgO doped with 0.53 cation % iron or less. At higher dopant levels both Nabarro-Herring creep and Coble creep contribute to creep deformation in air. An analytical procedure was developed to estimate from the creep data of polycrystalline, iron-doped MgO diffusion constants for Mg and O grain boundary diffusion and Mg lattice diffusion. The creep in air at 1500 C of coarse-grained iron-doped, (0.53 cation %) polycrystalline MgO consists of (1) viscous, Nabarro-Herring creep and (2) a nonviscous dislocation process that is independent of grain size. Nabarro-Herring creep was identified inpure polycrystalline Al2O3. In iron-doped (1 cation %), polycrystalline Al2O3 both Nabarro-Herring and Coble diffusional creep processes contribute to creep deformation.
Author (NSA)

N74-28038# California Univ., Livermore. Lawrence Livermore Lab.
ROOM-TEMPERATURE-CURABLE EPOXY FOR ADVANCED FIBER COMPOSITES
T. T. Chiao and R. L. Moore 15 Sep. 1973 16 p refs Presented at 29th Ann. Tech. and Management Conf., Washington, D. C., 5 Feb. 1974 Sponsored by AEC
(UCRL-74751; Conf-740204-1) Avail: NTIS HC $3.00

A room-temperature-curable epoxy system, a pure bisphenol A resin cured with a polyether triamine, was investigated for filament winding of advanced fiber composites. This system was used in two production operations and its handling characteristics are satisfactory. The system can be cured either at room temperature or at moderate temperatures (up to 70 C) to give well-balanced properties. Neither delamination nor fiber microbuckling of advanced composites parts using this resin system was experienced. The typical properties are: in tension, 73 MPa (10,800 psi) failure stress, 3240 MPa (470 ksi) modulus, and 4.6% failure strain; in compression, 88 MPa (12,700 psi) yield stress, 3490 MPa (505 ksi) modulus, and 3.7% yield strain; and in shear, 62 MPa (8930 PSI) failure stress, and 12.7 MPa (184 ksi) modulus.
Author (NSA)

N74-28039# United Kingdom Atomic Energy Authority, Harwell (England).
IRRADIATION EFFECTS IN CERAMICS
J. R. Matthews and P. E. Potter Sep. 1973 16 p refs Presented at the 7th Intern. Congr. on the Sci. of Ceramics, Juan-les-Pins, France, 24 Sep. 1973
(AERE-R-7539; Conf-730972-1) Avail: AEC Depository Libraries HC $3.00

The behavior of ceramic materials under fast-neutron irradiation is described, with emphasis on dimensional changes and the chemical effect of nuclear-reaction products. The damage processes and the behavior of point defects are outlined for a material with two components. The behavior of fissile materials is dealt within two parts: (1) The redistribution of oxide fast-reactor fuel constituents and the distribution and chemical form of fission products in oxide, carbide, and nitride fuel are reviewed. (2) A brief description is given of the current understanding of swelling from gaseous fission products. Then the use of B4C as neutron absorber material is described, followed by a shorter discussion on the potential use of rare earth oxides. Finally, radiation damage in potential ceramic structural materials is assessed.
Author (NSA)

N74-28040# Rutherford High Energy Lab., Chilton (England). Science Research Council.
WEIBULL'S FAILURE THEORY APPLIED TO AN EPOXY RESIN
B. Colyer Oct. 1973 21 p refs
(RL-73-114) Avail: AEC Depository Libraries HC $3.25

Weibull's theory of failure is applied to fracture stress values of an epoxy resin, measured at room and liquid helium temperatures, for use in superconducting magnets. The method is probably better than arithmetic averaging when calculating the mean fracture stress from a small number of tests. Author (NSA)

N74-28041# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
CALIFORNIUM OXIDE-PALLADIUM CERMET WIRE AS A Cf-252 NEUTRON SOURCE FORM
W. C. Mosley, P. E. McBeath, and P. K. Smith Jan. 1974 42 p refs
(Contract AT(07-2)-1)
(DP-1320) Avail: NTIS HC $4.00

An improved Cf-252 neutron source form was developed to enhance containment of Cf-252 during production of the sources and to lower the sale price of Cf-252 sources by commercial encapsulators. Process steps are described for preparing californium oxide-palladium cermet powder by palladium chemical plating, fabrication of cermet pellets by pressing and sintering, fabrication of bare wire by rolling, and adjustment (reduction) of Cf-252 linear concentration by roll cladding. The Cf-252 is distributed uniformly in the wires, which can be made in concentrations suitable for a full range of industrial source strengths. These processes were developed in laboratory tests with stand-ins and Cf-252 tracer, and were demonstrated with milligram quantities of Cf-252 in the Target Fabrication Facility (TFF).
Author (NSA)

N74-28042# General Motors Corp., Indianapolis, Ind. Detroit Diesel Allison Div.
BERYLLIUM REINFORCED TITANIUM MATRIX COMPOSITE BLADE FOR TURBINE FANS AND COMPRESSORS Final Report, 15 Jan. 1972 - 15 Dec. 1973
G. R. Sippel, R. W. Stusrud, and M. Herman Feb. 1974 129 p refs
(Contract N00019-72-C-0247)
(AD-777098; DDAD-EDR-8057) Avail: NTIS CSCL 11/4

A total of thirteen Be/Ti composite TF41-A100 LP1 fan blade forgings were produced by isothermal forging two types of composite material. Both composite material preforms were initially produced by coextruding Be/Ti composite material surrounded by a sheath of titanium alloy. One type composite was a single extrusion of beryllium and Ti 6Al-6V-2Sn alloy powders, while the other was a multiple extrusion of beryllium rods in wrought Ti 6Al-4V alloy sheaths, with the final extrusion containing a Ti 6Al-4V wrought sheath around the composite bundle. Ti 6Al-4V root block split halves were contour machined to fit the elliptical composite extrusions and subsequently diffusion bonded by hot isostatic pressing. Tensile properties and metallographic structures were determined from one blade forging of each type composite material. Tensile strengths of the Be rod/Ti composite blade airfoil ranged from 90-91 ksi compared to 46-67 ksi for the Be/Ti powder composite blade. (Modified author abstract)
GRA

N74-28043# Horizons, Inc., Cleveland, Ohio.
POLY (ARYLOXYPHOSPHAZENE) FOAMS AND WIRE COVERINGS Quarterly Technical Report
Kennard A. Reynard, Richard W. Sicka, James E. Thompson, and Selwyn H. Rose 15 Sep. 1973 34 p refs
(Contract N00024-73-C-5474)
(AD-777589; QTR-1) Avail: NTIS CSCL 11/9

A new family of polymers based on the phosphorus-nitrogen backbone, the poly(aryloxyphosphazenes), is being investigated as fire-resistant materials to replace existing materials. Efforts were devoted to synthesis of (C6H5O2PN-4-C2H5C6H4O)2PN)n and evaluation of methods for formation of expanded closed cell foams of low density. Vulcanizates (unexpanded) were found to possess adequate tensile strength and elongation. Studies of the poly(aryloxyphosphazene) foams for use as thermal insulation showed improvement in times to vision obscuration. Little generation of toxic or corrosive products upon burning of the poly(aryloxyphosphazene) was found. Foams have been produced by the use of chemical blowing agents and molding and curing under controlled pressure at temperature. (Modified author abstract)
GRA

N74-28044# Aerospace Corp., El Segundo, Calif. Lab. Operations.
THE FORMATION OF MICROSTRUCTURE IN GRAPHITIZABLE CARBONS Report for Jun. 1971 - Nov. 1973
Jack L. White 15 Apr. 1974 119 p refs
(Contract F04701-73-C-0074)

(AD-777814; TR-0074; SAMSO-TR-74-93) Avail: NTIS CSCL 11/2

The review focuses on progress made in the last decade in understanding the structural mechanisms involved in the formation of microstructure during the pyrolysis of graphitizable materials. The principal microstructural features are established in the final stages of liquid-phase pyrolysis after the carbonizing mass has transformed into a nematic liquid crystal, the carbonaceous mesophase, in which large aromatic layer molecules are aligned parallel in a lamelliform morphology but without the constraint of crystalline registry between the layers. The formation of the carbonaceous mesophase, usually near 450C, is essential to the thermal graphitizability of an organic precursor. In contrast to the three-dimensional crystal grains of most ceramic and metallic materials, the two-dimensional mesophase lamellae constitute the fundamental structural element of graphitizable carbons, and the filling of space by these flexible lamellae accounts for the characteristic bends, folds, splays, and lamellar stacking defects (disclinations) which are frozen into the microstructure as the mesophase congeals. (Modified author abstract) GRA

N74-28045# Bureau of Mines, Washington, D.C.
MINERALS YEARBOOK 1971. VOLUME 2: AREA REPORTS: DOMESTIC 1971 Annual Report
Jan. 1974 800 p refs
(PB-227842/2; BM-MYB-1971-Vol-2) Avail: NTIS MF $1.45; SOD HC $8.25 as C.I28.37:97/V.2 CSCL 08I

The report contains chapters covering the mineral industry of each of the 50 States, the U.S. island possessions in the Pacific Ocean and the Caribbean Sea, the Commonwealth of Puerto Rico, and the Canal Zone. This volume also has a statistical summary chapter and a chapter on employment and injuries. GRA

N74-28046# Bureau of Mines, Washington, D.C.
MINERALS YEARBOOK 1971. VOLUME 3: AREA REPORTS: INTERNATIONAL Annual Report
Jan. 1974 1088 p refs
(PB-227843/0; BM-MYB-1971-Vol-3) Avail: NTIS MF $1.45; SOD HC $10.00 as C.I28.37:971/v.3 CSCL 08I

The publication presents available mineral statistics for more than 130 foreign countries and discusses the importance of minerals to the economies of these nations. A separate chapter reviews minerals and their relationship to the world economy. GRA

N74-28047# LTV Aerospace Corp., Dallas, Tex. Vought Systems Div.
THE SIGNIFICANCE OF PROCESSING VARIABLES ON THE ADHESION OF SEALANTS AND ORGANIC COATINGS TO METALLIC AIRCRAFT SURFACES Final Report
A. B. Featherson Apr. 1974 129 p refs
(Contract N00019-73-C-0286)
(AD-778019; Rept-2-57110/4R-3158) Avail: NTIS CSCL 11/3

The report describes the results obtained in a study program to improve adhesion between aircraft type metals and organic coatings currently used. The blister test method was used which uses fluid pressure under the coating through a hole in the substrate to cause adhesive failure. Specimens were evaluated in the as prepared condition as well as after being subjected to hostile environments. Variations of standard surface treatments, application techniques, and adhesion promoting agents were evaluated. Surface treatments consisted of sulfuric acid anodized on aluminum alloy 7075, chromic acid anodized on aluminum alloy 2024, abrasion chemical conversion treatments on titanium alloy Ti 6Al 4V, phosphate chemical conversion treatments on steel 4340, and chromate and phosphate chemical conversion treatments on cadmium plated steel 4340. A total of seven organic coatings and five silanes were used in the evaluations. Author (GRA)

N74-28048# General Electric Co., Schenectady, N.Y.
SYNTHESIS AND PROPERTIES OF BISPHENOL FLUORENONE POLYCARBONATE AND BPF CARBONATE-DIMETHYLSILOXANE BLOCK POLYMERS Final Report, 14 Dec. 1972 - 14 Dec. 1973
Roger P. Kambour and George E. Niznik Jan. 1974 78 p refs
(Contract N00019-73-C-0152)
(AD-777731; SRD-74-020) Avail: NTIS CSCL 11/9

Polycarbonates from bisphenol fluorenone (BPF) have been synthesized by the addition of phosgene to aqueous caustic organic liquid suspensions of BPF and the BPF sodium salt. Addition of BPF end-capped dimethylsiloxane oligomers to these reaction media have resulted in copolycondensations to produce BPF carbonate-dimethyl siloxane multi-sequence black polymers of 7% to 25% dimethylsiloxane with siloxane blocks averaging 10 to 40 units in length. All polymers save one were water white and castable into clear films. Dynamic mechanical measurements, scanning calorimetry and thermooptical analysis are discussed. Mechanical properties are reported. The homopolymer and block polymers have been compression molded. BPF polycarbonate has been extruded as a transparent smooth ribbon at 370C. The ASTM flex strengths of BPF polycarbonate moldings were measured. Flammability and burning behavior are reported. GRA

N74-28049# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
CHARACTERISTICS OF ACOUSTIC EMISSION SIGNALS FROM CERAMICS Final Report, 26 Dec. 1972 - 22 Feb. 1974
Lloyd J. Graham and George A. Alers 22 Feb. 1974 85 p refs
(Contract N00019-73-C-0174)
(AD-778015; SC544.14FR) Avail: NTIS CSCL 11/2

Acoustic emission bursts generated during slow and rapid crack growth in a variety of polycrystalline ceramics as well as twinning and rapid crack growth in sapphire were characterized by their number, amplitude, pulse shape, and frequency content. The microstructures and fracture surface features of the specimens were examined and correlations were made between these features and the characteristics of the acoustic emissions bursts. Nine materials were studied covering a range of preparation techniques, compositions, and grain sizes. These included alumina from three sources, magnesia from three sources, plus spinel, porcelain, and silicon nitride from one source each. A variety of types of frequency spectra of the individual acoustic emission bursts were observed which in some cases could be identified with a specific generation process such as crack-twin interaction or step-wise transgranular cleavage. (Modified author abstract) GRA

N74-28050# Catholic Univ. of America, Washington, D.C. Vitreous State Lab.
THE APPLICABILITY OF LIGHT SCATTERING SPECTROSCOPY TO THE MEASUREMENT OF THE VISCOELASTIC PARAMETERS OF LUBRICANTS
James F. Dill, Peter W. Drake, and Theodore A. Litovitz Mar. 1974 43 p refs
(Contract N00014-67-A-0377-0018; NR Proj. 229-007; NR Proj. 051-545)
(AD-777953; TR-2) Avail: NTIS CSCL 07/4

Various techniques for the measurement of the viscoelastic properties of lubricants are described. These include a novel method using light scattering and photon correlation spectroscopy. This combination of techniques has been applied to a detailed viscoelastic study of the lubricant 5P4E (a polyphenyl ether manufactured by Monsanto Chemical Corp.). The results reported include: Sound velocity measurements obtained by both light scattering and ultrasonics; measurements of the structural relaxation function and the average structural relaxation times using digital correlation spectroscopy; and static shear viscosity. These measurements have all been made as a function of pressure. The results demonstrate that the light scattering techniques can extend the range of viscosity measurements by at least four orders of magnitude. (Modified author abstract) GRA

N74-28051# Boeing Aerospace Co., Seattle, Wash. Research and Engineering Div.
STUDY OF GRAPHITE FIBER REINFORCED THERMOPLASTIC COMPOSITES Final Report, 1 Apr. 1973 - 1 Jan. 1974
J. T. Hoggatt Feb. 1974 122 p refs
(Contract N00019-73-C-0414)

(AD-778000; D180-18034-1) Avail: NTIS CSCL 11/4

The objective of the program was to study the feasibility of using thermoplastic matrices in structural graphite reinforced composites. To achieve this objective, resin/fiber compatibility studies, mechanical and physical property determinations, and environmental resistance studies were conducted. GRA

N74-28122* Kanner (Leo) Associates, Redwood City, Calif.
SOME ASPECTS OF THE BEHAVIOR OF MATERIALS USED IN MECHANICAL VIBRATION INSULATING TECHNIQUES
Constantin Pupazen and Cristian Ionid *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 39-44 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 393-398 (For availability see N74-28115 17-23)
CSCL 11D

N74-28123* Kanner (Leo) Associates, Redwood City, Calif.
EFFICIENT SYSTEMS OF SOUND INSULATING FLOORS
Ioan Ion Giurgiu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 45-51 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 399-406 (For availability see N74-28115 17-23)
CSCL 11D

N74-28124* Kanner (Leo) Associates, Redwood City, Calif.
CONTRIBUTIONS TO THE ACOUSTIC PROTECTION OF CIVIL BUILDINGS TAKING INTO ACCOUNT THE USE OF LIGHT PREFABS
Marius Smigelschi *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 52-58 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 407-412 (For availability see N74-28115 17-23)
CSCL 13B

N74-28237* North Carolina State Univ., Raleigh.
FACTORS AFFECTING THE THERMAL SHOCK RESISTANCE OF SEVERAL HAFNIA BASED COMPOSITES CONTAINING GRAPHITE OR TUNGSTEN M.S. Thesis
Lynn David Lineback *In its* Develop. of High Temp. Mater. for Solid Propellant Rocket Nozzle Appl. 14 Jan. 1974 51 p refs (For availability see N74-28236 17-28)
CSCL 11D

N74-28238* North Carolina State Univ., Raleigh.
MODEL FOR THERMAL STRESS RESISTANCE OF TRULY ELASTIC MATERIALS CONTAINING MORE THAN ONE CRACK Ph.D. Thesis
Lynn David Lineback *In its* Develop. of High Temp. Mater. for Solid Propellant Rocket Nozzle Appl. 14 Jan. 1974 104 p refs (For availability see N74-28236 17-28)
CSCL 11D

19 MATHEMATICS

Includes calculation methods and theory; and numerical analysis. For applications see specific categories. For related information see also: 08 Computers.

N74-28052*# Illinois Univ., Urbana. Antenna Lab.
A MATRIX EQUATION SOLUTION BY AN OPTIMIZATION TECHNIQUE
M. J. Johnson and R. Mittra Dec. 1972 51 p refs
(Grant NGR-14-005-009)
(NASA-CR-130276; Rept-72-11; SR-20; UILU-ENG-72-2557 Avail: NTIS HC $5.75 CSCL 12A

The computer solution of matrix equations is often difficult to accomplish due to an ill-conditioned matrix or high noise levels. Two methods of solution are compared for matrices of various degrees of ill-conditioning and for various noise levels in the right hand side vector. One method employs the usual Gaussian elimination. The other solves the equation by an optimization technique and employs a function minimization subroutine. Author

N74-28053*# Houston Univ., Tex. Dept. of Mathematics.
RESULTS ON THE TWO POPULATION FEATURE SELECTION PROBLEM USING PROBABILITY OF CORRECT CLASSIFICATION AS A CRITERION
B. Charles Peters, Jr. May 1974 14 p refs
(Contract NAS9-12777)
(NASA-CR-134334; Rept-32) Avail: NTIS HC $4.00 CSCL 12A

Variational equations are presented for maximizing the probability of correct classification as a function of a 1xn feature selection matrix B for the two-population problem. For the special case of equal covariance matrices the optimal B is unique up to scalar multiples and rank one sufficient. For equal population means, the best 1xn B is an eigenvector corresponding either to the largest or smallest eigenvalue of sigma sub 2 to the minus 1 power sigma sub 1 where sigma sub 1 and sigma sub 2 are the nxn covariance matrices of the two populations. The transformed probability of correct classification depends only on the eigenvalue. Finally, a procedure is proposed for constructing an optimal or nearly optimal kxn matrix of rank k without solving the k-dimensional variational equation. Author

N74-28054*# Rice Univ., Houston, Tex. Inst. for Computer Services and Applications.
OPTIMAL DESIGN OF AN UNSUPERVISED ADAPTIVE CLASSIFIER WITH UNKNOWN PRIORS
Demetrios Kazakos May 1974 32 p refs
(Contract NAS9-12776)
(NASA-CR-134312; Rept-275-025-013) Avail: NTIS HC $4.75 CSCL 12A

An adaptive detection scheme for M hypotheses was analyzed. It was assumed that the probability density function under each hypothesis was known, and that the prior probabilities of the M hypotheses were unknown and sequentially estimated. Each observation vector was classified using the current estimate of the prior probabilities. Using a set of nonlinear transformations, and applying stochastic approximation theory, an optimally converging adaptive detection and estimation scheme was designed. The optimality of the scheme lies in the fact that convergence to the true prior probabilities is ensured, and that the asymptotic error variance is minimum, for the class of nonlinear transformations considered. An expression for the asymptotic mean square error variance of the scheme was also obtained. Author

N74-28055# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
SIMPLEST BOUNDARY VALUE PROBLEMS FOR THE SCHROEDINGER EQUATIONS
V. Garchinski 1973 20 p refs In RUSSIAN
(JINR-P2-7484) Avail: AEC Depository Libraries HC $3.00

The simplest, exactly solvable, boundary value problems for the Schroedinger equations are discussed. A short description of one-dimensional pseudoprocesses in terms of integral stochastic equations is given. Author (NSA)

N74-28056# Rocketdyne, Canoga Park, Calif.
APPROXIMATELY OPTIMUM TESTS AND CONFIDENCE BOUNDS FOR RELIABILITY PARAMETERS Interim Report, 1 Jan. - 31 Dec. 1973
N. R. Mann 27 Feb. 1974 12 p refs
(Contract F44620-71-C-0029; AF Proj. 9769)
(AD-776787; R-9464; AFOSR-74-0340TR) Avail: NTIS CSCL 12/1

The research concerned investigation of methods for statistical testing of linear models used in the analysis of materials and chemical compounds and the study of the use of the non-central chi-square distribution to obtain simple, easily implemented, approximations to percentiles of distributions which are used widely by investigators in reliability analysis. (Modified author abstract) GRA

20 METEOROLOGY

Includes climatology; weather forecasting; and visibility studies. For related information see also: 13 Geophysics; and 30 Space Sciences.

N74-28057 Freie Univ., Berlin (West Germany). Inst. fuer Meteorologie.
METEOROLOGICAL DATA, VOLUME 135, NO. 12: RESULTS OF THE SYNOPTIC SERVICE DURING 1973. DAILY AND MONTHLY WEATHER MAPS (GROUND, 500 mb), TABLES AND BRIEF SCIENTIFIC ARTICLES, DECEMBER [METEOROLOGISCHE ABHANDLUNGEN. BAND 135, HEFT 12: ERGENBNISSE DES SYNOPTISCHEN DIENSTES IM JAHRE 1973. TAEGLICHE UND MONATLICHE WETTERKARTEN (BODEN 500 mB), TABELLEN UND KLEINERE WISSENSCHAFTLICHE AUFSAETZE, DEZEMBER]
1973 189 p refs
Avail: Issuing Activity

The detailed results of radiosonde ascents performed by the aerological section of the Institute for Meteorology and Geophysics at the Free University of Berlin are presented. Using these data, monthly time cross sections of the averaged temperature and the zonal and meridional wind components at ground level and 500 mb height were constructed. Extreme and mean values of the temperature, pressure, geopotential, wind data, precipitation, dust, and radioactivity are included. Attached scientific studies consider winter weather predictions, description of comet Kohoutek, and meteorological winter sport data. Transl. by G.G.

N74-28058# Technische Univ., Berlin (West Germany). Inst. fuer Theoretische Meteorologie.
THE CLOUD AS A FLUIDIC MICROSTRUCTURE SYSTEM: A MODEL FOR CONVECTIVE RAINFALLS AND THEIR PARAMETERIZATION ON THE BASIS OF THEORETICAL CLOUD PHYSICS [DIE WOLKE ALS MIKROSTRUKTURIERTES FLUIDES SYSTEM EIN MODELL KONVEKTIVER REGENFAELLE UND DEREN PARAMETRISIERUNG AUF DER GRUNDLAGE DER THEORETISCHEN WOLKENPHYSIK]
J. Pankrath 1973 90 p refs In GERMAN
Avail: NTIS HC $7.50

Particle mechanics in a reacting fluidic system are used to analyze nonequilibrium hydrothermodynamic processes in water clouds. Considered are the effects of falling, phase change, coagulation, breaking of droplets, as well as changes in particle distribution and effects of moist air equilibrium changes. A one dimensional numerical model for convective rainfalls illustrates the interrelation between rainfall microstructure and moist thermal atmosphere in the precipitation region. Transl. by G.G.

N74-28059# Committee on Public Works (U. S. Senate).
THE COST OF CLEAN AIR Annual Report of the Administrator of the Environmental Protection Agency to the Congress of the United States
Washington GPO Oct. 1973 101 p refs Presented to the Comm. on Public Works, 93d Congr., 1st Sess., 4 Oct. 1973 Prepared by EPA
(S-Doc-93-40; GPO-22-447) Avail: Comm. on Public Works

Cost estimates on a national scale for control of air pollution sources are presented. Air pollution sources discussed include transportation, power, and industrial sources. Hazardous pollutants are analyzed, and emission limits proposed for asbestos, beryllium, and mercury. Cost estimates are shown for research and development, abatement and control, and enforcement. F.O.S.

N74-28060*# Scientific Translation Service, Santa Barbara, Calif.
THE ROLE OF ORBITAL MANNED STATIONS IN WEATHER SERVICE
E. V. Khrunov Washington NASA Jun. 1974 13 p Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 4, Apr. 1974 p 3-7
(Contract NASw-2483)
(NASA-TT-F-15680) Avail: NTIS HC $4.00 CSCL 04B

The role of man in the solution of scientific and practical problems on board the space station and the significance of those stations for weather service are discussed. Author

N74-28061*# Techtran Corp., Glen Burnie, Md.
USE OF CLOUD PICTURES IN CYCLOGENESIS FORECASTING
R. Zhalyu and T. P. Popova Washington NASA Jun. 1974 19 p refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 4, Apr. 1974 p 14-24
(Contract NASw-2485)
(NASA-TT-F-15682) Avail: NTIS HC $4.00 CSCL 04B

It has been concluded from satellite photographs that cyclones can be predicted from cloud formations. Such formations are analyzed along with a tropical type of cyclone. Author

N74-28062# National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
CATALOG OF METEOROLOGICAL SATELLITE DATA: ESSA 9 AND NOAA 1 TELEVISION CLOUD PHOTOGRAPHY, 1 APRIL - 30 JUNE 1971 Key to Meteorological Records Documentation No. 5.330
1973 207 p refs
Avail: NTIS HC $13.50

Catalog is presented describing the television cloud photography obtained by meteorological satellites. Photographic data acquired by ESSA 9 and NOAA 1 during the period of April 1, 1971 through June 30, 1971 Digitized cloud maps replace the manually constructed nephanalyses which had been used in the earlier catalogs. Two polar stereographic maps are used to show the daily distribution of clouds over the earth, one for the Northern Hemisphere and one for the Southern Hemisphere. These maps are arranged according to pass day. Author

N74-28063# Kanner (Leo) Associates, Redwood City, Calif.
CONCERNING REVISION OF THE ENVIRONMENTAL STANDARDS FOR SULFUR OXIDES
Nov. 1973 15 p Transl. into ENGLISH from the Japanese Sponsored by EPA
(APTIC-50170; TR-145-74) Avail: NTIS HC $4.00

Proposals are discussed for reviewing the sulfur oxide pollution standards to a level at which there is no health danger. Results concerning the effects of sulfur dioxide on human health are presented along with proposals concerning concentration conditions. A chronological outline of control measures for sulfur oxides is included. F.O.S.

N74-28064# Scientific Translation Service, Santa Barbara, Calif.
STUDY OF THE METHOD OF MEASURING SULFURIC ACID MIST IN THE ATMOSPHERE
T. Tsujikawa, Y. Takatsuka, and K. Yoshida 1974 18 p refs Transl. into ENGLISH from Nippon Koci Shi (Japan), v. 18, no. 5, May 1971 p 363-365 Sponsored by EPA
(APTIC-30366; TR-127-74) Avail: NTIS HC $4.00

The methods for measuring the sulfur oxide content of air were studied in the laboratory by generating sulfuric acid mist and collecting it using various filter papers. The experimental results discussed include: (1) sulfuric acid mist collection efficiency of Whatman No. 4 filter, (2) comparison between sodium tetraborate titration and NaOH neutral titration, and (3) comparison of sulfuric acid collection with various filter papers. A study of the sulfuric acid mist in Yokkaichi City using Toyo filter paper 5A is reported. F.O.S.

N74-28065# Kanner (Leo) Associates, Redwood City, Calif.
ATMOSPHERIC DIFFUSION THEORY OF FACTORY EXHAUST SMOKE AND ITS APPLICATIONS
Ide Yasuo Sep. 1973 46 p refs Transl. into ENGLISH from Mizu Kogaku Shiriizu (Japan), no. 71-B-9, Jul. 1971 Sponsored by EPA
(APTIC-33772; TR-48-74) Avail: NTIS HC $5.50

Industrial air pollution is discussed in terms of smoke diffusion in the atmosphere. Topography, atmospheric stability, inversions, and atmospheric diffusion are discussed along with atmospheric models. F.O.S.

N74-28066# Kanner (Leo) Associates, Redwood City, Calif.
MEASUREMENT MATERIALS ON AIRBORNE AND SETTLED BACTERIA IN JAPAN

Eri Honda Nov. 1973 61 p refs Transl. into ENGLISH from Kuki Seijo (Japan), v. 10, no. 7, Jan. 1973 p 11-32 Sponsored by EPA
(APTIC-50502; KS-35) Avail: NTIS HC $6.25

Air pollution caused by bacteria in places requiring aseptic conditions is studied. Tabulated data are included of airborne and settled bacteria from published surveys. F.O.S.

N74-28067# National Weather Service, Silver Spring, Md.
NUMERICAL WEATHER PREDICTION ACTIVITIES: NATIONAL METEOROLOGICAL CENTER, FIRST HALF 1973
Sep. 1973 40 p refs
Avail: NTIS HC $5.00

The numerical weather prediction (NWP) activities of the National Meteorological Center (NMC) for the first half of 1973 are summarized. There were no changes made in the operational six-layer primitive equation model. Operational changes were made in the area of integration and the lateral boundary conditions of the limited-area fine-mesh model (LFM). Progress has been made in the automation of plotting of surface reports. Author

N74-28068# Kanner (Leo) Associates, Redwood City, Calif.
PERFORMANCE PROPERTIES OF CATALYST HEATING TYPE CARBON MONOXIDE REMOVING EQUIPMENT
Tadashi Akiyama and Harumi Sakano Aug. 1972 21 p refs Transl. into ENGLISH from Kuki Seijo (Japan), v. 10, no. 6, 1 Dec. 1972 p 36-43 Sponsored by EPA
(APTIC-48481; KS-34) Avail: NTIS HC $4.25

Equipment for removing carbon monoxide from air is described in terms of catalytic heating. The detoxifying effect of catalysts with respect to CO, and the construction of a heat accumulator type heat exchanger are discussed along with CO measurements. F.O.S.

N74-28069# Scientific Translation Service, Santa Barbara, Calif.
THE LAW AND TECHNOLOGY OF AIR POLLUTION CONTROL IN THE TEXTILE INDUSTRY
Juergen Bernert 1974 27 p refs Transl. into ENGLISH from Melliand Textilber. (Heidelberg), v. 54, no. 3, Mar. 1973 p 295-300 Sponsored by EPA
(APTIC-50136; TR-188-74) Avail: NTIS HC $4.50

Laws are described for plants in which varnishes, dyes, or plastics are coated on metals, paper, cloth, wood, glass fiber or similar materials and dried with heat. Textile and textile finishing industries fall under this category and measuring methods and methods of pollution control are briefly summarized. M.C.F.

N74-28070# Translation Consultants, Ltd., Arlington, Va.
LASERS MEASURE AIR POLLUTION
J. Roessler 1974 6 p refs Transl. into ENGLISH from Umschau Wiss. Tech. (Frankfurt), v. 73, no. 11, 1973 p 343-344 Sponsored by EPA
(APTIC-51317; TR-214-74) Avail: NTIS HC $4.00

The investigation of air pollution by lasers is discussed. The problems in interpreting the intensity of the signal are discussed for scattering by particle size and concentration. The attenuation by the atmosphere, for gaseous pollutants is considered. F.O.S.

N74-28071# Kanner (Leo) Associates, Redwood City, Calif.
UPWARD TREND: THE EMISSION OF SULFUR COMPOUNDS IN WEST GERMANY
Nov. 1973 10 p ref Transl. into ENGLISH from Umwelt, v. 3, no. 2, 1973 p 24-26 Sponsored by EPA
(APTIC-52271; TR-170-74) Avail: NTIS HC $4.00

The quantity of sulfur emitted into the atmosphere was reported for West Germany along with estimates on the global sulfur emission. Industrial and residential contributions to the release of sulfur compounds are discussed and results given. M.C.F.

N74-28072*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SATELLITE IMAGERY AND WEATHER FOR THE BESEX AREA, 15 FEBRUARY - 10 MARCH 1973
Per Gloersen and Paul E. LaViolette (Naval Oceanographic Office) Jun. 1974 90 p Sponsored in part by NOAA
(NASA-TM-X-70692; X-910-74-186; NOOTR-245) Avail: NTIS HC $7.50 CSCL 04B

The Bering Sea Experiment (BESEX) was conducted in February and March 1973 to study ice cover, sea state and zones of precipitation by means of airborne microwave radiometers over the Bering Sea. The images were computer processed from satellite data tapes. In processing the tapes, compensation was made for satellite attitude and altitude variations, as well as for image rectification. Visual imagery was taken in the 0.4 to 1.1-u range, and infrared imagery in the 8.0 to 13.0-u range. Author

N74-28073*# Scientific Translation Service, Santa Barbara, Calif.
METEOROLOGICAL OBSERVATIONS ABOARD THE SALYUT ORBITING STATION
V. A. Bugayev, T. T. Popova, and T. A. Yakovleva Washington NASA Jul. 1974 15 p refs Transl. into ENGLISH from Meteorol. i Gidrol. (Moscow), no. 4, 1974 p 8-13
(Contract NASw-2483)
(NASA-TT-F-15681) Avail: NTIS HC $4.00 CSCL 04B

The results of synoptic analysis of some cloud pictures made by the crew of the Salyut orbital station are described. Author

N74-28074*# Techtran Corp., Glen Burnie, Md.
GARP ATLANTIC TROPICAL EXPERIMENT AND RADIATION FACTORS IN THE WEATHER AND CLIMATE
K. L. Kondratyev Washington NASA Jul. 1974 21 p refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 4, Apr. 1974 p 97-106
(Contract NASw-2485)
(NASA-TT-F-15694) Avail: NTIS HC $4.25 CSCL 04B

The basic features of the energetics of the tropical atmosphere and the role of radiation factors in formation of the most typical meteorological formations of the lower latitudes (convective cloudiness and cloud clusters, tropical waves, etc.) are surveyed. Considerations are advanced regarding the position of the GATE radiation subprogram (RPA) in the total array of observations, and the most important divisions of RPA are examined in this context. It is demonstrated that special aircraft laboratories should be used as a decisive means of conducting RPA. Author

N74-28075# Kanner (Leo) Associates, Redwood City, Calif.
EMISSION AND IMMISSION MEASUREMENTS OF AIR POLLUTANTS USING LASERS
R. Beck and W. Englisch Dec. 1973 18 p Transl. into ENGLISH from Messtechnik (West Germany), v. 81, no. 2, 1973 p 39-45 Sponsored by EPA
(APTIC-51361; TR-215-74) Avail: NTIS HC $4.00

The use of a laser which permits gaseous air pollutants to be analyzed rapidly and accurately even at low concentrations is discussed. Not only single samples or continuous streams of air, but also remote clouds of pollutants can be analyzed in this manner. Basically, there are three different methods of remote analysis which are discussed. They are based on Raman scattering, resonance fluorescence, or resonance absorption measurements. The best results may be obtained by the resonance absorption method. Author

N74-28076# Finnish Meteorological Inst., Helsinki.
PRECIPITATION AND SNOW COVER DATA, 1971
1973 110 p in FINNISH and ENGLISH
Avail: NTIS HC $8.50

Precipitation data for Finland are reported including snow observations for the winter of 1970-1971. Monthly, annual, and maximum diurnal precipitation data are included. F.O.S.

N74-28077*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
INVESTIGATION OF THE TURBULENT WIND FIELD BELOW 500 FEET ALTITUDE AT THE EASTERN TEST RANGE, FLORIDA Final Report, Jun. 1971 - Jun. 1973
Alfred K. Blackadar, Hans A. Panofsky, and Franz Fiedler Washington NASA Jun. 1974 92 p refs
(Contract NAS8-21140)
(NASA-CR-2438; M131) Avail: NTIS HC $4.00 CSCL 04B

A detailed analysis of wind profiles and turbulence at the 150 m Cape Kennedy Meteorological Tower is presented. Various methods are explored for the estimation of wind profiles, wind variances, high-frequency spectra, and coherences between various

levels, given roughness length and either low-level wind and temperature data, or geostrophic wind and insolation. The relationship between planetary Richardson number, insolation, and geostrophic wind is explored empirically. Techniques were devised which resulted in surface stresses reasonably well correlated with the surface stresses obtained from low-level data. Finally, practical methods are suggested for the estimation of wind profiles and wind statistics. Author

N74-28078# Comitato Nazionale per l'Energia Nucleare, Rome (Italy).
[METEOROLOGICAL DATA FOR THE EUREX PLANT AT SALUGGIA]
3 May 1973 83 p refs In ITALIAN
(RT/PROT-(73)-14) Avail: AEC Depository Libraries HC $6.25

The meteorological data for the EUREX plant at Saluggia are presented in tabular and graphic form. A brief description is given of the characteristics of the area and of the general climatological profile. NSA

N74-28079# Fleet Weather Central/Joint Typhoon Warning Center, FPO San Francisco, Calif. 96630.
ANNUAL TYPHOON REPORT, 1973 Annual Report, Jan. - Dec. 1973
1973 104 p
(AD-777093) Avail: NTIS CSCL 04/2

This is an annual publication summarizing the tropical cyclone season in the western North Pacific, Bay of Bengal, and the central North Pacific. A brief narrative is given on each typhoon in the western North Pacific including the best track. Pertinent reconnaissance data used to construct the best tracks are provided. Forecast verification data and statistics for the JTWC are summarized. Research efforts at the JTWC is discussed briefly. Author (GRA)

N74-28080# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
THE VARIABILITY OF AIRFIELD VISIBILITY: A PRELIMINARY ASSESSMENT Environmental Research Papers
Donald A. Chisholm and Horst Kruse 15 Jan. 1974 31 p refs
(AF Proj. 8628)
(AD-777219; AFCRL-ERP-462; AFCRL-TR-74-0027) Avail: NTIS CSCL 04/2

In this paper some results are presented concerning temporal and spatial variability of automated visibility measurements along a runway in conjunction with tower measurements. Comparisons are also made with variability statistics drawn from multi-transmissometer systems evaluated for the FAA. GRA

N74-28081# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
RESEARCH INTO RADIATIVE TRANSFER MODELING AND APPLICATIONS Final Report, 1 Mar. - 30 Jun. 1973
Cynthia K. Whitney, Robert E. Var, and Carlton R. Gray Jul. 1973 91 p refs
(Contract F19628-73-C-0212; AF Proj. 7621)
(AD-777140; CSDL-56-54100; AFCRL-TR-73-0420) Avail: NTIS CSCL 04/2

A new and computationally efficient method for treating problems in radiative transfer was adapted for more general problems and submitted to numerical testing to establish accuracy and efficiency in comparison to other methods. Results indicate that the method has promise for application in a wide variety of practical problems in atmospheric physics. Author (GRA)

N74-28082# National Weather Service, Silver Spring, Md. Systems Plans and Design Div.
SOME RESULTS FROM APPLYING A COST-EFFECTIVENESS MODEL FOR EVALUATING AVIATION WEATHER DISSEMINATION TECHNIQUES Final Report, Apr. 1972 - Dec. 1973
Henry Newhouse Dec. 1973 77 p refs
(Contract DOT-FA72WAI-283; FAA Proj. 132-422-062)
(AD-777441; FAA-RD-73-128) Avail: NTIS CSCL 04/2

Some results were obtained from a cost-effectiveness model which was developed for evaluating the performance of various combinations of aviation weather dissemination techniques. Basic data on which the model operates consist of distributions of registered general aviation aircraft, air traffic activity and total flight services, FAA forecasts of growth in general aviation during the next decade, and the cost of various dissemination techniques and facilities. These data are used to generate estimates of demand in a 26 x 60 matrix of 1 degree squares covering the 48 states. Dissemination technique effectiveness values are arrived at largely through two factors--accessibility and usefulness-which were obtained via a Delphi approach. As part of the model's output, measures of system performance are given in terms of percentage of demand satisfied by the total system, each technique, and each portion of the flight profile. Computations give cost-per-demand served, cost of the total system plus overhead, and the cost of each technique in terms of capital, operating, and personnel costs. (Modified author abstract) GRA

N74-28083# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EFFORTS AGAINST HAIL DAMAGE. WHAT IS THE EFFECT ON ECONOMICS?
G. Sulakvelidze 4 Apr. 1974 11 p Transl. into ENGLISH from Zarya Vostoka (USSR), 8 Jul. 1973 p 3
(AD-777294; FTD-HT-23-1099-74) Avail: NTIS CSCL 04/2

At the end of May, in the Eastern Georgia, heavy hail storm seriously damaged the vineyards over a considerable area. Considerable material loss is evident. The article discusses economic advantages of using hail prevention measures. GRA

N74-28084# Calspan Corp., Buffalo, N.Y.
CASE STUDIES OF COASTAL CONVECTIVE STORMS AS OBSERVED BY DOPPLER RADAR Annual Report, 1 Dec. 1972 - 31 Jan. 1974
Calvin C. Easterbrook and C. William Rogers Apr. 1974 75 p refs
(Contract N00014-72-C-0176)
(AD-778365; CALSPAN-CK-5077-M-2) Avail: NTIS CSCL 04/2

The life cycles of coastal convective storms are studied utilizing a Doppler weather radar. The cases presented involve storms triggered by the sea breeze front. Horizontal and vertical scanning as well as fixed vertical pointing were utilized to observe the storms. Analyses of the observations suggest that convective storms move with the source of the updraft rather than the environmental wind and that the interaction between the vertically moving air and the environmental flow determines the time history of the storm structure. Author (GRA)

N74-28085# Rutgers Univ., New Brunswick, N.J. Water Resources Research Inst.
INVESTIGATION OF THE EFFECTS OF URBANIZATION ON PRECIPITATION TYPE, FREQUENCY, AREAL AND TEMPORAL DISTRIBUTION, PHASE 2
Mark D. Shulman and Edward A. Brotak Oct. 1973 91 p refs
(Contract DI-14-31-0001-3615)
(PB-227232/6; OWRR-B-044-NJ(3)) Avail: NTIS HC $4.00 CSCL 04B

From a previous phase of research fifty years of daily precipitation values were available on tape for a network of 20 stations in the N.Y. metropolian area. The earlier study showed that under certain wind conditions, precipitation augmentation was discerned downwind of the urban complex. However, the present study indicates that the urban area does not have any affect on daily precipitation patterns. Analyses were also made of probabilities of wet and dry periods of different lengths using the Markov chain probability model. The analysis of the average year at Hightstown gives an insight into the processes which govern precipitation patterns in this area. GRA

N74-28086# ESL, Inc., Sunnyvale, Calif.
STATISTICAL PREDICTION OF EQUILIBRIUM TEMPERATURE FROM STANDARD METEOROLOGICAL DATA BASES
C. Michael Hogan, Leda C. Patmore, and Harry Seidman Aug. 1973 283 p refs
(Contract EPA-68-01-0167)
(PB-226874/6; W74-03330; EPA-660/2-73-003) Avail: NTIS MF $1.45; SOD HC $2.55 CSCL 08H

A computer program has been written and applied to

investigate the stochastic distribution of equilibrium temperature as determined from standard meteorological data base. The equilibrium temperature at an air-water interface is the temperature which would be attained by the surface if the net heat flow through it were zero. Since it is a basic factor in the prediction of actual water temperatures, the distribution of equilibrium temperature, and hence of water temperature, is an important statistic. (Modified author abstract) GRA

N74-28087# Navy Weather Research Facility, Norfolk, Va.
YELLOWSTONE FIELD RESEARCH EXPEDITION 8
Edward E. Hindman, II 1974 12 p refs
(AD-778332; NAVWEARSCHFAC-TP-6-68) Avail: NTIS CSCL 04/2

Vonnegut (1948) demonstrated that rapid expansion of moist compressed air could be used to produce vast quantities of ice embryos for seeding supercooled clouds. This phenomenon was studied by Schaefer (1953) with systematic laboratory experiments. In conjunction with high velocity wind tunnel and turbine research, Hill (1965) and others have recently studied the nucleation of water vapor and other gases in the rapid expansion of compressed air from supersonic and hypersonic nozzles. From these reports, the Navy Weather Research Facility (NAVWEARSCHFAC) has attempted to develop a theory for optimum compressed-air seeding techniques. GRA

N74-28088# Naval Postgraduate School, Monterey, Calif.
THE MESOSCALE DISTRIBUTION OF RAINFALL IN CALIFORNIA RAINSTORMS M.S. Thesis
Benjamin Tappan, III Mar. 1974 73 p refs
(AD-777873) Avail: NTIS CSCL 04/2

The rainfall patterns in California, produced by six storms of the 1972-1973 winter storm season, were analyzed in detail in order to determine the mesoscale distribution of precipitation with respect to the larger-scale synoptic systems. It was found that the structure of precipitation patterns primarily reflected orographic influences rather than mesoscale circulation features intrinsic to the larger-scale system. Heaviest amounts of rainfall were concentrated primarily along the major mountain ranges with much lesser amounts in the interior valleys. Storms with fronts (Class II) produced more precipitation in the inland valleys and more convective type precipitation than storms without well defined fronts (Class I). Storms with fronts exhibited geographically fixed bands of precipitation that paralleled the surface front. An elongation of precipitation in the direction of the 500 mb flow was found in one case study. Author (GRA)

N74-28089# California State Div. of Highways, Sacramento. Transportation Lab.
EVALUATION OF A METHOD OF FOG DISPERSAL BY IONIZATION Final Report
Gerald R. Bemis, Kenneth O. Pinkerman, and Earl C. Shirley Jul. 1973 24 p refs
(PB-229334/8; CA-DOT-TL-7128-1-73-23) Avail: NTIS HC $4.25 CSCL 04B

The effectiveness of a truck-mounted ionized, water-surfactant fog dispersal technique was evaluated under controlled conditions. The amount of time required for an untreated fog in a chamber to attain a reference visibility (450 feet as estimated by a human observer) was compared to the time required for a treated fog to reach the same reference visibility. The time required to reach 450 feet in the untreated fog was significantly different than the time required to reach 450 feet with any of the contractor's applications of dispersal treatment. Based on these data, it was concluded that the fog dispersal technique used by the cotractor did not demonstrate effectiveness in dispersing fog in a controlled environment. Author (GRA)

N74-28090# Center for the Environment and Man, Inc., Hartford, Conn.
TESTS OF AN URBAN METEOROLOGICAL POLLUTANT MODEL USING CO VALIDATION DATA IN THE LOS ANGELES METROPOLITAN AREA, VOLUME 1 Final Report
Joseph P. Pandolfo and Clifford A. Jacobs May 1973 184 p refs
(Contract EPA-68-02-0223)
(PB-228325/7; CEM-490-A-Vol-1; EPA-R4-73-025a) Avail: NTIS HC $12.25 CSCL 13B

The urban boundary layer model was tested with data from Los Angeles, California. The tests were intended to estimate the degree to which observed spatial and temporal variations of meteorological conditions and concentrations of a stable air pollutant could be realistically simulated by the model. GRA

N74-28091# Center for the Environment and Man, Inc., Hartford, Conn.
TESTS OF AN URBAN METEOROLOGICAL POLLUTANT MODEL USING CO VALIDATION DATA IN THE LOS ANGELES METROPOLITAN AREA. VOLUME 2: FORTRAN PROGRAM AND INPUT/OUTPUT SPECIFICATION Final Report
Joseph P. Pandolfo and Clifford A. Jacobs May 1973 146 p
(Contract EPA-68-02-0223)
(PB-228326/5; CEM-490-A-Vol-2; EPA-R4-73-025b) Avail: NTIS HC $10.50 CSCL 13B

Input deck make-up and FORTRAN 4 listings are presented for the numerical model described in Volume 1. Author (GRA)

N74-28092# Illinois State Water Survey, Urbana.
MODELING STUDIES FOR EVALUATION AND PLANNING OF PRECIPITATION ENHANCEMENT IN ILLINOIS Technical Report, 1972 - 1973
H. T. Ochs, III and B. C. Ceselski 30 Jun. 1973 84 p refs
(Contract DI-14-06-D-7197)
(PB-228820/7; ISWS-73-CON-147; TR-6) Avail: NTIS HC $7.25 CSCL 04B

The development of a complex 2-dimensional, time-dependent, cloud-scale numerical model which depicts atmospheric convection and cumulus growth in a vertical cross section of the atmosphere was performed to determine the magnitude and extent of the possible extra-area effects of planned weather modification. A relatively large-scale (meso- to synoptic-scale) 3-dimensional modeling effort was initiated. The model was being adapted as an advanced prognostic tool to be used with field operations, and as a diagnostic tool to investigate potential extra-area effects of artificially-seeded organized convection. A 1-dimensional cloud model was adapted for use in a climatology of seeding-potential study. Ten years of data from 4 midwestern radiosonde stations provided the input to the model. The model, in turn, produced a long-period, regional data set of potential seeding effects and large-scale atmospheric conditions. (Modified author abstract) GRA

N74-28093# Illinois State Water Survey, Urbana.
CLIMATIC STUDIES OF EXTRA-AREA EFFECTS FROM SEEDING Technical Report, 1971 - 1973
P. T. Schickedanz Jun. 1973 60 p refs
(Contract DI-14-06-D-7197)
(PB-228819/9; ISWS-73-CON-146; TR-5) Avail: NTIS HC $6.00 CSCL 04B

Two climatic investigations concerning detection of alternations of precipitation beyond a target area were pursued. In the first investigation, monthly and seasonal precipitation data were used to study the natural distribution of highs and lows in precipitation patterns over a 325,000 sq mi area centered in southern Illinois during the period 1950-69. The second investigation concerned the monthly and seasonal precipitation patterns (1950-69) in, and downwind, of large cities having urban-induced increases in precipitation. (Modified author abstract) GRA

N74-28094# Illinois State Water Survey, Urbana.
THE 1973 OPERATION FOR METROMEX Annual Operation Report
William P. Lowry Dec. 1973 65 p
(Grant NSF GI-34797)
(PB-228855/3; ISWS-73-CON-150) Avail: NTIS HC $6.25 CSCL 04B

Project METROMEX is a federation of individual scientists with diverse sources of funding but complementary research objectives. The report describes the calendar of field observations conducted under METROMEX in the Greater St. Louis area during June-August 1973. Greater detail on the calendar is found in the reports of individual cooperators in this report. All

METROMEX activities in 1973 are described including analytical plans and the 6 science groups involved. Author (GRA)

N74-28095# International Business Machines Corp., Gaithersburg, Md. Federal Systems Div.
STATE AIR DATA INFORMATION SURVEY Final Report
T. H. Lewis Jan. 1974 129 p
(Contract EPA-68-02-1008)
(PB-228621/9; EPA-450/3-74-001) Avail: NTIS HC $9.50 CSCL 13B

The results of the State Air Data Survey were based on the states for which information was available in a timely fashion. The techniques presently used to store, access and maintain emission inventory and air quality files; significant problems associated with maintaining and using such files; and anticipated problems in meeting the proposed Federal regulations for the State quarterly and semi-annual reporting requirements, especially as related to providing data in standard EPA formats were addressed in this survey. GRA

N74-28025 Environmental Protection Agency, Washington, D.C. Div. of Laboratory Operations.
RELATIONSHIP OF AIR QUALITY MEASUREMENTS TO CRITERIA AND EMISSION STANDARDS
Ronald E. Engel and Delbert S. Barth *In* Bur. of Mines Technol. and Use of Lignite 1972 p 49-55 refs (For availability see N74-28020 17-18)

N74-28026 Environmental Protection Agency, Research Triangle Park, N.C. Development Engineering Branch.
NITROGEN OXIDES, SULFUR OXIDES, AND PARTICULATE CONTROL TECHNOLOGY FOR FOSSIL FUEL COMBUSTION
R. E. Harrington *In* Bur. of Mines Technol. and Use of Lignite 1972 p 56-69 refs (For availability see N74-28020 17-18)

21 NAVIGATION

Includes guidance; autopilots; star and planet tracking; inertial platforms; and air traffic control. For related information see also: 07 Communications.

N74-28096 Stanford Univ., Calif.
ON-LINE ESTIMATION OF PARAMETERS USING EXPERIMENTALLY DEVELOPED GYRO MODELS, AND OTHER APPLICATIONS Ph.D. Thesis
Vance Dean Coffman 1974 426 p
Avail: Univ. Microfilms Order No. 74-13614

Strapdown attitude reference systems with body fixed attitude sensors rely on gyros to maintain the reference between attitude measurements. In the past, gyro drift rate was compensated in inertial navigators but scaling errors were of only minor importance. However, for maneuvering vehicles, both the gyro scale factor and drift must be compensated. This research is an investigation of performance that could reasonably be expected from gyro hardware after compensating both multiplicative (gyro scale factor) and additive (gyro drift) error sources. A major part of the effort was devoted to acquiring test data on six gyros and developing gyro models to fit these data. An estimator was developed that will determine the gyro model parameters on-line. This formulation for the filter equations employs direct utilization of measurements. Dissert. Abstr.

N74-28097* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PASSIVE DUAL SPIN MISALIGNMENT COMPENSATORS Patent
James H. Donohue and Benjamin G. Zimmerman, inventors (to NASA) Issued 25 Jun. 1974 5 p Filed 29 Sep. 1972 Supersedes N73-11680 (11 - 02, p 0207)
(NASA-Case-GSC-11479-1; US-Patent-3,818,767; US-Patent-Appl-SN-293739; US-Patent-Class-74-5.5; US-Patent-Class-244-1SA) Avail: US Patent Office CSCL 22B

A combination dual-spin gyroscopically stabilized device is described having a spinning rotor and a non-spinning platform. Two substantially lossless mechanical resonators, resonant at the spin frequency, are orthogonally positioned on the platform for compensation for the disturbing torque acting on the platform due to rotor misalignment.
Official Gazette of the U.S. Patent Office

N74-28098*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
SIRU UTILIZATION. VOLUME 1: THEORY, DEVELOPMENT AND TEST EVALUATION
Howard Musoff Mar. 1974 281 p refs
(Contract NAS9-8242)
(NASA-CR-138574; R-747-Vol-1) Avail: NTIS HC $17.25 CSCL 17G

The theory, development, and test evaluations of the Strapdown Inertial Reference Unit (SIRU) are discussed. The statistical failure detection and isolation, single position calibration, and self alignment techniques are emphasized. Circuit diagrams of the system components are provided. Mathematical models are developed to show the performance characteristics of the subsystems. Specific areas of the utilization program are identified as: (1) error source propagation characteristics and (2) local level navigation performance demonstrations. Author

N74-28099# Joint Publications Research Service, Arlington, Va.
POSITION FINDING BY ARTIFICIAL EARTH SATELLITE
Yu. Baranov 7 Jun. 1974 9 p Transl. into ENGLISH from Morsk. Flot (Moscow), no. 4, 1974 p 29-31
(JPRS-62193) Avail: NTIS HC $4.00

A description of the Doppler method of ship position location using navigational satellites is presented. Author

N74-28100*# Linguistic Systems, Inc., Cambridge, Mass.
SOME PARTICULARS OF THE LANDING AIDS DLS AND SETAC
K. D. Eckert and G. Peuker Washington NASA Jun. 1974 33 p Transl. into ENGLISH of "Einige Besonderheiten der Landenhilfen DLS und SETAL" DGLR report 73-019 presented at DGLR/DGON Symp. New Approach and Landing Tech., Duesseldorf, 2-4 May 1973 34 p
(Contract NASw-2482)
(NASA-TT-F-15607; DGLR-73-019) Avail: NTIS HC $4.75 CSCL 17G

The SETAC and DLS landing aid systems are described briefly. The 15-KHz beacon SROB of the SETAC system which allows azimuth to be measured over 360 deg is described in detail. The angle of elevation measurement processes of both systems is presented. E.J.O.

N74-28101*# Kanner (Leo) Associates, Redwood City, Calif.
SAFETY DURING AUTOMATIC LANDING WITH POOR VISIBILITY
J. P. DeBeachene Washington NASA Jun. 1974 23 p Transl. into ENGLISH from Navigation (France), v. 22, Jan. 1974 p 31-46
(Contract NASw-2481)
(NASA-TT-F-15716) Avail: NTIS HC $4.25 CSCL 17G

Fundamental principles of safety are discussed for automatic landing systems in low visibility. The ILS is briefly described along with automatic control systems, including the monitored, doubly monitored, and quadruple. Aspects of safety regulations are also discussed. E.J.O.

N74-28102*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
FLIGHT INVESTIGATION OF MANUAL AND AUTOMATIC VTOL DECELERATING INSTRUMENT APPROACHES AND LANDINGS
James R. Kelly, Frank R. Niessen, Jerry J. Thibodeaux, Kenneth R. Yenni, and John F. Garren, Jr. Washington Jul. 1974 42 p refs
(NASA-TN-D-7524; L-9311) Avail: NTIS HC $3.25 CSCL 01D

A flight investigation was undertaken to study the problems associated with manual and automatic control of steep, decelerating instrument approaches and landings under simulated instrument conditions. The study was conducted with a research

helicopter equipped with a three-cue flight-director indicator. The scope of the investigation included variations in the flight-director control laws, glide-path angle, deceleration profile, and control response characteristics. Investigation of the automatic-control problem resulted in the first automated approach and landing to a predetermined spot ever accomplished with a helicopter. Although well-controlled approaches and landings could be performed manually with the flight-director concept, pilot comments indicated the need for a better display which would more effectively integrate command and situation information.
Author

N74-28103# Aerospace Guidance and Metrology Center, Newark Air Force Station, Ohio.
INFRARED OUTPUT US ARMY ANTICOLLISION BEACON HIGH INTENSITY LIGHT Final Report
Harry S. Shepherd, Jr. Jan. 1974 35 p refs
(AD-777594; AGMC-74-008II) Avail: NTIS CSCL 17/7

A U.S. Army Anticollision Beacon was tested for infrared output in watts per steradian from 0.7-1.2 micrometers. Measurements of both day and night operating modes were made which included spectral output and goniometric scans in the azimuthal and elevation planes. Author (GRA)

N74-28104# Naval Ammunition Depot, Crane, Ind.
SLANT VISUAL RANGE (SVR)/APPROACH LIGHT CONTACT HEIGHT (ALCH) MEASUREMENT SYSTEM: EVALUATION IN FOG Final Report
Jan. 1974 135 p refs
(Contract DOT-FA71WAI-213)
(AD-777307; FAA-RD-74-7) Avail: NTIS CSCL 17/7

Systems with potential for predicting SVR/ALCH were tested at the National Aviation Facilities Experimental Center (NAFEC), Federal Aviation Administration, Department of Transportation, Atlantic City, New Jersey. These systems: estimation of the slant path transmittance were compared to data being generated by NBS transmissometers located at several levels on nearby 160-foot towers. The transmittance values predicted by the systems being evaluated were used to compute RVR and SVR data. The results of these computations were compared to the actual RVR-SVR calculated based upon NBS transmissometer measurement. The report contains data on the stratification of the fogs observed at NAFEC during the test duration. Pilot eye response is considered with emphasis on techniques of determining the pilot's adaptation level. The pilot's adaptation level calculation is combined with (1) the extinction rate measurements, (2) pilot's eye response and (3) the geometry of the scenario in order to form ALCH and SVR algorithms. Author (GRA)

N74-28105# Illinois Univ., Savoy. Aviation Research Lab.
SIMULATOR TESTS OF PILOTAGE ERROR IN AREA NAVIGATION WITH VERTICAL GUIDANCE: EFFECTS OF DESCENT ANGLE AND DISPLAY SCALE FACTOR Final Report, Nov. 1972 - Oct. 1973
Richard J. VanderKolk and Stanley N. Roscoe Oct. 1973 150 p refs
(Contract DOT-FA71WA-2574)
(AD-777889; ARL-73-13/FAA-73-2; FAA-RD-73-202) Avail: NTIS CSCL 01/2

Previous RNAV and VNAV flight and simulation experiments in this series, specifically the VNAV flight experiment documented in FAA Report RD-72-126, suggested this study in which environmental and flight variables were systematically controlled to permit precise assessment of the effects on pilotage error of variations in vertical descent angle and vertical guidance display scale factor for each of two pilot groups representing different experience levels. Resulting flight profiles were less complex than those previously employed in that no course changes were required, thereby reducing the need for communications and inflight planning by the pilot. Experimental values of pilotage error were compared statistically after first being separated into transient and steady-state portions for each flight segment to allow comparison with corresponding steady-state values assumed in FAA AC 90-95 and RTCA DO-152. Pilot performance was measured in terms of altitude, crosstrack, airspeed, and procedural errors and information processing rate on an independent side task. (Modified author abstract) GRA

N74-27885 Joint Publications Research Service, Arlington, Va.
ERRORS OF THE EXTREMUM METHOD OF FINDING THE MERIDIAN DURING THE INITIAL ALIGNMENT OF INERTIAL SYSTEMS
E. I. Sliv, Yu. A. Borisov, Z. G. Zost, and A. D. Ilicheva *In its* Inertial Instruments (JPRS-62187) 6 Jun. 1974 p 7-12 refs Transl. into ENGLISH from Priborostroyeniye, (Leningrad), no. 8, 1973 p 68-71 (For availability see N74-27883 17-14)

22 NUCLEAR ENGINEERING

Includes nuclear reactors and nuclear heat sources used for propulsion and auxiliary power. For basic research see: 24 Physics, Atomic, Molecular, and Nuclear. For related information see also: 03 Auxiliary Systems; and 28 Propulsion Systems.

N74-28106*# National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md.
A POWER CONDITIONING SYSTEM FOR RADIOISOTOPE THERMOELECTRIC GENERATOR ENERGY SOURCES
Joseph A. Gillis Jun. 1974 27 p ref
(NASA-TM-X-70678; X-711-74-164) Avail: NTIS HC $4.50 CSCL 18E

The use of radioisotope thermoelectric generators (RTG) as the primary source of energy in unmanned spacecraft is discussed. RTG output control, power conditioning system requirements, the electrical design, and circuit performance are also discussed.
F.O.S.

N74-28107# Brookhaven National Lab., Upton, N.Y. Health Physics and Safety Div.
ENVIRONMENTAL SAFETY EVALUATIONS FOR NUCLEAR INSTALLATIONS
A. P. Hull 1973 23 p refs Presented at the Regional Study Group Meeting on Radiological and Environ. Protection, Lima, 19-23 Nov. 1973; sponsored by IAEA and WHO Sponsored by AEC
(BNL-18350; Conf-731127-1) Avail: NTIS HC $3.25

The inclusion of environmental safety in the siting, design, and operation of nuclear installations is discussed. Safety evaluation including physics, chemistry, and biology, and the more specialized fields of meteorology, engineering, ecology, medicine, and electronics are outlined. It was concluded that the upper limit of the risks from nuclear installations are small compared to other commonly accepted risks of daily living.
NSA

N74-28108# Los Alamos Scientific Lab., N.Mex.
NUCLEAR HEAT AND HYDROGEN IN FUTURE ENERGY UTILIZATION
L. A. Booth and J. D. Balcomb Nov. 1973 28 p
(Contract W-7405-eng-36)
(LA-5456-MS) Avail: NTIS HC $4.00

Future demand for the world's supply of carbon-based fuels will eventually deplete this supply to the point at which their use becomes economically infeasible. Hydrogen, which is virtually inexhaustible in the form of water, could be substituted for natural gas and petroleum-based fuels for industrial and residential heating and for transportation. Nuclear energy, either fusion or fission, would be the primary energy source. Thermal energy from the nuclear heat source would be converted to electric energy in a conventional heat-engine cycle. Hydrogen could be produced from water by a cyclic thermochemical process. Gaseous hydrogen for industrial and residential heat would be transported in a high-pressure pipeline system. Liquid hydrogen or hydrogen stored in metal hydrides could be used for transportation fuels. Author (NSA)

N74-28109# Atomic Energy Commission, Washington, D.C.
REVIEW OF THE RESEARCH PROGRAM OF THE DIVISION OF CONTROLLED THERMONUCLEAR RESEARCH
Oct. 1973 266 p refs Presented at CTR Standing Comm. Meeting, Cambridge, Mass., 26 Apr. 1973
(WASH-1271) Avail: NTIS HC $7.60

Each of the off-site contractors supported through the Office

of Research and each of the four national laboratories supplied data about their research activities. A review concerning the following six activities is given: (1) Plasma properties: equilibrium, stability, and transport; (2) plasma production and heating, (3) plasma measurements and instrumentation; (4) computer applications to CTR, (5) exploratory concepts in CTR, and (6) atomic, molecular, and nuclear physics in CTR. NSA

N74-28110# Brookhaven National Lab., Upton, N.Y.
RESEARCH APPLICATIONS OF SYNCHROTRON RADIATION
R. E. Watson, ed. and M. L. Perlman, ed. Jun. 1973 211 p refs Presented at Study Symp., Upton, N. Y., 25-28 Sep. 1972
(Contract AT(30-1)-16)
(BNL-50381, Conf-7209107-1) Avail: NTIS HC $12.75

The conference covers biological diffraction, X-ray diffraction in biology, protein structure determination by diffraction, X-ray microscopy, UV absorption studies on biophysical systems, biological responses to ionizing radiations, holography, far ultraviolet photochemistry, free atoms and molecules, X-ray astronomy. NSA

23 PHYSICS, GENERAL

Includes acoustics, cryogenics, mechanics, and optics. For astrophysics see: 30 Space Sciences. For geophysics and related information see also: 13 Geophysics, 20 Meteorology; and 29 Space Radiation.

N74-28111 Cornell Univ., New York.
VIBRATIONAL RELAXATION TIME OF CARBON DIOXIDE AT LOW TEMPERATURE Ph.D. Thesis
John Richard Jones 1973 75 p
Avail: Univ. Microfilms Order No. 74-10853

Vibrational relaxation times were measured behind shock waves in pure carbon dioxide, in a mixture of carbon dioxide and argon and in a mixture of carbon dioxide and nitrogen. The measurements were taken over the temperature ranges 270-5700K, 345-5700K and 380-4600K, respectively. The lowest of these temperatures were achieved by cooling the shock tube used with methanol passed through a bath of dry ice. The wide temperature ranges studied were needed to establish the effect of the attractive part of the intermolecular potential on the relaxation time. The relaxation time was measured using a laser schlieren system to record the density gradient profile behind the shock wave. Using the equations expressing conservation of mass, momentum and energy, the temperature was determined as a function of distance behind the shock wave. Dissert. Abstr.

N74-28112 Wisconsin Univ., Madison.
MNR RELAXATION STUDY OF ATOMIC TRANSPORT PROPERTIES IN SOLID AND LIQUID XENON Ph.D. Thesis
Luis Enrique Barroilhet 1973 91 p
Avail: Univ. Microfilms Order No. 74-8988

Rotating frame spin-lattice relaxation times of the Xe-129 spins were investigated in the liquid and solid xenon using pulsed NMR techniques. Three relaxation mechanisms were found to contribute to 1/T sub 1 rho each of them being dominant in different temperature ranges. In the xenon liquid phase, the 164 K to 161 K temperature range, the temperature dependence of 1/T sub 1 rho is relatively weak and shows no evidence of strong anomalies close to the freezing point. For small RF field strength, in the solid phase between 160 K and 122 K, 1/T sub 1 rho is dominated by the Xe-129 nuclear magnetic dipole-dipole interactions which fluctuate due to atomic diffusion. The value obtained for the atomic diffusion activation energy is 7.3 kcal/mole. This observed 1/T sub 1 rho behavior is in good agreement with that predicted from previous experiments on the motional narrowing. Dissert. Abstr.

N74-28113 Ohio State Univ., Columbus.
SURFACE SECOND SOUND IN SUPERFLUID HELIUM Ph.D. Thesis
Sin-Yan Shen 1973 186 p
Avail: Univ. Microfilms Order No. 74-11047

The discovery of surface second sound and some measurements of its velocity in 3He absorbed on the surface of superfluid helium were described. The surface second sound velocity and the surface tension were measured simultaneously in the temperature range of 20 to 300mK for two samples of different 3He concentration. The sound velocity was measured by a time of flight technique and the surface tension by a capillary rise method. In the latter, the temperature variation of the capillary rise between the plates of a parallel plate capacitor was balanced by an electric field, with a resolution of a hundredth of a per cent of the surface tension. The experimental results are consistent with a model in which the adsorbed 3He is treated as a weakly interacting two-dimensional gas of surface quasiparticles. Dissert. Abstr.

N74-28114 Ohio State Univ., Columbus.
THE DIFFRACTION AT THE EDGE OF A UNIFORM IMPEDANCE SURFACE Ph.D. Thesis
Yeong Ming Hwang 1973 194 p
Avail: Univ. Microfilms Order No. 74-10976

The diffraction by a wedge with different impedance boundary conditions at its two surfaces was considered. The diffraction by a plane with a two-part impedance boundary, which is a special case of the wedge, was also considered. In the case of a rightangle wedge a functional transformation is used to simplify the boundary conditions. It is seen that this method can be extended in an approximate way to obtain a useful solution for the wedge of arbitrary-angle, provided that one of the wedge surfaces is a Dirichlet boundary. The eigenfunction solutions for the transformed functions are replaced by integral representations, which are then evaluated asymptotically by the modified Pauli-Clemmow method of steepest descent. In the case of diffraction by the two-part plane surface, the Wiener-Hopf technique is applied. New factorization formulas, which are well suited for numerical computations, are employed. Dissert. Abstr.

N74-28115*# Kanner (Leo) Associates, Redwood City, Calif.
THE FOURTH NATIONAL CONFERENCE ON ACOUSTICS. VOLUME 1, C: ROOM AND ARCHITECTURAL ACOUSTICS
Washington NASA Jun. 1974 101 p refs Transl. into ENGLISH of A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 344-470
(Contract NASw-2481)
(NASA-TT-F-15376) Avail: NTIS HC $8.25 CSCL 20A

Acoustical noise reduction treatments for buildings are focused on building and insulation materials as well as structural design criteria. For individual titles, see N74-28116 through N74-28131.

N74-28116* Kanner (Leo) Associates, Redwood City, Calif.
CONTRIBUTION TO THE ACOUSTIC STUDY OF THEATER AUDITORIUMS TRANSFORMABLE FOR DIFFERENT TYPES OF PRODUCTIONS
R. Belea and E. Harastaseanu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 2-6 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 345-351 (For availability see N74-28115 17-23)
CSCL 20A

The auditorium of the Bucharest National Theater has been equipped with devices permitting it to be transformed into three functional types of rooms for different types of productions. In view of the purpose of the room (spoken theater) and the volume of the room (3,000-3,600 cu m 3) the optimum reverberation time is 0.95 sec at a frequency of 1,000 Hz. By applying the different types of acoustic treatment, a reverberation time ranging from 0.96 to 1.06 sec was obtained. The problem of flutter echoes in the arena was solved by applying semispherical bodies to the fixed ceiling. The level of noise transmitted to the auditorium was reduced down to the Cz25 curve. Author

N74-28117* Kanner (Leo) Associates, Redwood City, Calif.
OPTIMIZING ACOUSTICAL TREATMENT
Nicolae Beuran, Septimiu Ramboiu, Ioan Farcas, and Erich Halpert *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-

TT-F- 15376) Jun. 1974 p 7-12 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 353-358 (For availability see N74-28115 17-23)
CSCL 20A

A mathematical linear programming model is presented for optimizing acoustical treatment and interior decoration of concert and other public halls. This method provides the designer with a range of acoustically correct solutions at increased economical efficiency. The mathematical model uses geometrical data about the room, recommended reverberation time values, the architect's choice of given sound absorbing structures and finishing materials. The model permits inclusion of aesthetical considerations about conditioning, proportioning, or, on the contrary, reciprocal exclusion of any classes of material and/or sound absorbing structure. Author

N74-28118* Kanner (Leo) Associates, Redwood City, Calif.
NUMERICAL COMPUTATION OF ECHOGRAMS IN A ROOM: APPLICATION TO DETERMINATION OF INTELLIGIBILITY
Francois Santon *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 14-19 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 361-366 (For availability see N74-28115 17-23)
CSCL 20A

Echogram recordings are used to estimate the acoustic quality of a room. Using two methods based on geometric acoustics, echograms are computed for rooms of irregular shape. The image method and the ray method have been applied to a heptahedral room as well as a conference hall. The results obtained, which have been verified experimentally, permit an estimate of the intelligibility coefficient. Author

N74-28119* Kanner (Leo) Associates, Redwood City, Calif.
NEW THEORY ON THE REVERBERATION OF ROOMS
Jean Pujolle *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 20-28 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 369-374 (For availability see N74-28115 17-23)
CSCL 20A

The inadequacy of the various theories which have been proposed for finding the reverberation time of rooms can be explained by an attempt to examine what might occur at a listening point when image sources of determined acoustic power are added to the actual source. The number and locations of the image sources are stipulated. The intensity of sound at the listening point can be calculated by means of approximations whose conditions for validity are given. This leads to the proposal of a new expression for the reverberation time, yielding results which fall between those obtained through use of the Eyring and Millington formulae; these results are made to depend on the shape of the room by means of a new definition of the mean free path. Author

N74-28120* Kanner (Leo) Associates, Redwood City, Calif. **c11**
ANECHOIC CHAMBER IN INDUSTRIAL PLANTS
E. Halpert, O. Juncu, R. Lorian, D. Marfievici, and I. Mararu *In its* The 4th Natl. Conf. on Acoustic, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 29-31 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 375-379 (For availability see N74-28115 17-23)
CSCL 14B

A light anechoic chamber for routine acoustical measurements in the machine building industry is reported. The outer housing of the chamber consists of modules cast in glass fiber reinforced polyester resin; the inner housing consists of pyramidal modules cut out of sound absorbing slates. The parameters of this anechoic chamber facilitate acoustical measurements according to ISO and CAEM recommendations. Author

N74-28121* Kanner (Leo) Associates, Redwood City, Calif.
ASPECTS OF CHECKING INSTALLATIONS FOR THE NOISE LEVEL OF ELECTRONIC EQUIPMENT
Petre Rotileanu, Mariana Augustin, and Mircea Burtan *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 32-38 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 381-391 (For availability see N74-28115 17-23)
CSCL 20A

The level of noise generated by electrical engineering equipment constitutes one of the principal parameters that define the quality of the product. Particular attention is given to chambers for testing the noise level of electrical engineering products to improve their quality. Some general considerations are outlined about the constructional elements and parameters of these installations. Author

N74-28122* Kanner (Leo) Associates, Redwood City, Calif.
SOME ASPECTS OF THE BEHAVIOR OF MATERIALS USED IN MECHANICAL VIBRATION INSULATING TECHNIQUES **c18**
Constantin Pupazen and Cristian Ionid *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 39-44 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 393-398 (For availability see N74-28115 17-23)
CSCL 11D

The inadequacy is considered of characterizing a vibration insulating material by its dynamic modulus of elasticity as determined by the resonance method. It is shown that the dynamic modulus of elasticity actually depends on the material's loading speed as well as on the volume of the load, so that it is necessary to determine its variation as a function of the two parameters. The needed values are to be derived for actual conditions of use. Author

N74-28123* Kanner (Leo) Associates, Redwood City, Calif.
EFFICIENT SYSTEMS OF SOUND INSULATING FLOORS **c18**
Ioan Ion Giurgiu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 45-51 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 399-406 (For availability see N74-28115 17-23)
CSCL 11D

Experiments are summerized on dwelling houses with a view to the creation of efficient warm floors. The experiments concern the types of floors built in Rumania with currently produced materials. At the present time experiments are continuing with solutions based on concrete slabs equipped with a PVC carpet and placed on an elastic layer. Author

N74-28124* Kanner (Leo) Associates, Redwood City, Calif.
CONTRIBUTIONS TO THE ACOUSTIC PROTECTION OF CIVIL BUILDINGS TAKING INTO ACCOUNT THE USE OF LIGHT PREFABS **c18**
Marius Smigelschi *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 52-58 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 407-412 (For availability see N74-28115 17-23)
CSCL 13B

Usually it is expensive to obtain suitable damping coefficients for exterior and interior walls made up of light materials. Hence, acoustic protection problems must be tackled in parallel with the design and introduction of new types of elements. A comparison of classical solutions shows that interior separating walls raise the most difficult problems. In order to reduce building costs it is necessary to make a careful study of architectural solutions and to provide for wall structures with characteristics that vary with the particular case. Author

N74-28125* Kanner (Leo) Associates, Redwood City, Calif.
CONCERNING THE DAMPING COEFFICIENTS OF EXTERIOR BUILDING ELEMENTS FOR AERIAL NOISE
V. Pocsa, M. Poppel, Al. Veres, and L. Biborosch *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 59-64 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1, C: Acustica Arhitecturala Si a

Salilor, Bucharest, 29-31 May 1973 p 413-420 (For availability see N74-28115 17-23)
CSCL 20A

The values employed to define the sound reduction coefficient of exterior walls for aerial noise do not take into account the continuous increase in the outside noise level nor its energy variation as a function of time. These aspects are analyzed by estimating the outside and inside noise levels on the basis of calculating an equivalent noise (L sub ech), a level with a maximum duration and the values of L sub 10, L sub 50 and L sub 90. The values obtained permit determination of the wall's sound reduction coefficients that are compared with those obtained by the customary method. It is shown that the sound reduction values of the wall coincide for the case of sound levels with a maximum duration and the values of L sub 90. Author

N74-28126* Kanner (Leo) Associates, Redwood City, Calif.
TRANSPARENT SOUND SCREENS
Flaviu Bizo and Rozsa Draghici *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 65-69 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 423-427 (For availability see N74-28115 17-23)
CSCL 20A

Transparent sound screens consisting of glass (organic glass) plates placed at fixed angles with respect to the floor are considered. Noise levels in the screened area depend on the cumulative effect of direct, reverberated and refracted components of sound energy radiated by the source. This effect is analyzed on the analogy of the summation of electrical impedances. Inasmuch as under given circumstances sufficient noise control can be obtained, transparent screens seem to solve the problem of unimpeded supervision of installations in noisy workshops and power plants; in administrative buildings, computing centers, design bureaus, etc., they ensure acoustic comfort without space losses and without inspiring claustrophobia. Author

N74-28127* Kanner (Leo) Associates, Redwood City, Calif.
CONCERNING THE SOUND INSULATION OF BUILDING ELEMENTS MADE UP OF LIGHT CONCRETES
Ioan Ion Giurgiu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 70-77 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 429-435 (For availability see N74-28115 17-23)
CSCL 20A

The sound insulating capacity of building elements made up of light concretes is considered. Analyzing differentially the behavior of light concrete building elements under the influence of incident acoustic energy and on the basis of experimental measurements, coefficients of correction are introduced into the basic formulas for calculating the sound insulating capacity for the 100-3,2000 Hz frequency band. Author

N74-28128* Kanner (Leo) Associates, Redwood City, Calif.
OPTIMIZATION OF THE ACOUSTIC ABSORPTION COEFFICIENTS OF CERTAIN FUNCTIONAL ABSORBENTS
V. Pocsa, L. Biborosch, Al. Veres, E. Halpert, R. Lorian, and T. Botos *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 78-82 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 437-442 (For availability see N74-28115 17-23)
CSCL 20A

The sound absorption coefficients of some functional absorbents (mineral wool plates) are determined by the reverberation chamber method. The influence of the angle of inclination of the sound absorbing material with respect to the surface to be treated is analyzed as well as the influence of the covering index, defined as the ratio of the designed area of a plate and the area of the treated surface belonging to another plate. As compared with the conventional method of applying sound-absorbing plates, the analyzed structures have a higher technological and economical efficiency. The optimum structure corresponds to an angle of inclination of 15 deg and a covering index of 0.8. Author

N74-28129* Kanner (Leo) Associates, Redwood City, Calif.
SOUND-ABSORBING SLABS AND STRUCTURES BASED ON GRANULAR MATERIALS (BOUND AND UNBOUND)
Serban Petre-Lazar and Gheorghe Popeea *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 83-89 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 445-451 (For availability see N74-28115 17-23)
Copyright. CSCL 20A

Sound absorbing slabs and structures made up of bound or unbound granular materials are considered and how to manufacture these elements at the building site. The raw material is a single grain powder (sand, expanded blast furnace slag, etc.) that imparts to the end products an apparent porosity of 25-45% and an energy dissipation within the structure leading to absorption coefficients that can be compared with those of mineral wool and urethane. Author

N74-28130* Kanner (Leo) Associates, Redwood City, Calif.
COMPLEX SOUNDPROOFING OF INDUSTRIAL ROOMS
V. Pocsa, Al. Veres, and L. Biborosch *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 90-95 refs Transl. into ENGLISH from A 4-A Confertina Nationala de Acustica Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 453-459 (For availability see N74-28115 17-23)
CSCL 20A

Some structures treated for sound absorption are described that are used to soundproof industrial rooms with a very high noise level. Soundproofing treatments for the walls and coilings or only for the ceilings are considered. In the case of relatively small rooms having a noise source with a high level, complex treatments involve, in addition to soundproofing of the walls and ceiling, suspended panels specially oriented with respect to the noise source. The efficiency of the adopted solutions is compared with calculated damping values. Author

N74-28131* Kanner (Leo) Associates, Redwood City, Calif.
HIGHLY EFFICIENT SPECIAL SOUND ABSORBING SOLUTIONS
Mariana Ionescu and Serban Petre-Lazar *In its* The 4th Natl. Conf. on Acoustics, Vol. 1, C (NASA-TT-F-15376) Jun. 1974 p 96-101 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica Vol. 1, C: Acustica Arhitecturala Si a Salilor, Bucharest, 29-31 May 1973 p 461-469 (For availability see N74-28115 17-23)
CSCL 20A

Highly efficient special sound absorbing structures with the following criteria are considered: (1) A distribution surface of the sound absorbing material greater than that of the building element on which the structure is placed; (2) The highest possible absorption coefficient in the widest possible frequency band; and (3) adaptability to different construction and aesthetic conditions. Author

N74-28132# National Bureau of Standards, Boulder, Colo. Cryogenics Div.
CRYOGENIC REFRIGERATORS: AN UPDATED SURVEY
T. R. Strobridge Jun. 1974 12 p
(NBS-TN-655) Avail: SOD HC $0.30 as C13.46:655

Efficiency, weight, volume, and cost data for 95 cryogenic refrigerators and liquifiers are reported. Original 1969 data and those for 49 additional refrigerators and liquifiers are presented spanning refrigeration capacities from 0.2 to 1 million W and temperatures from 1.85 to 90 K. Generally, there is no change in the trends exhibited by the older data except that the high temperature, low capacity new units seem to be larger, heavier and slightly less efficient than in prior years. Cost remain the same as predicted before even though no dollar value adjustments were made. Author

N74-28133*# Kanner (Leo) Associates, Redwood City, Calif.
LIGHT SCATTERING IN SEAWATER. EXPERIMENTAL RESULTS AND THEORETICAL APPROACH
Andre Morel Washington NASA Jul. 1974 153 p refs Transl. into ENGLISH from the French report AGARD-LS-61 (Contract NASw-2481)

(NASA-TT-F-15662; AGARD-LS-61) Avail: NTIS HC $10.75 CSCL 20F

The general shape of the scattering indicatrix for seawater is discussed. The respective roles of molecular and particle scattering are examined separately, since seawater must be considered an optically disturbed medium. The influence of wavelength on the indicatrix, scattering selectivity, and variations in the rate of polarization are also examined. Scattering by particles is discussed based on the assumption of spherical particle shape. Then scattering by a system of polydispersed spherical particles is examined. The most rational numerical values to be assigned to the various factors influencing the phenomenon are studied. The influence of the exponent of the law of distribution and that of the index of refraction on the indicatrix are analyzed, and rational values are assigned to these factors. The roles of various classes of particles, according to size, are compared and the dependence of scattering on the spectrum is analyzed. Author

N74-28134*# National Aeronautics and Space Administration. Pasadena Office, Calif.

AN IMPROVED HELIUM REFRIGERATOR Patent Application

Ervin R. Wiebe, inventor (to NASA) (JPL) Issued 12 Jun. 1974 14 p Sponsored by NASA

(Contract NAS7-100)

(NASA-Case-NPO-13435-1; US-Patent-Appl-SN-478803) Avail: NTIS HC $4.00 CSCL 20L

An improved helium refrigerator is described with a plurality of counter-flow heat exchangers and a maximum reserve cooling capacity. The final or low temperature heat exchanger is substantially filled with liquid helium. An electrical bridge circuit including a pair of temperature-responsive resistors is mounted on the low temperature heat exchanger for providing a continuous indication of the reserve cooling capacity of the refrigerator. Author

N74-28135*# Kanner (Leo) Associates, Redwood City, Calif.

PHYSICAL, CHEMICAL AND BIOLOGICAL FACTORS AFFECTING THE PROPAGATION OF LIGHT IN SEAWATER

A. Ivanoff Washington NASA Jul. 1974 82 p refs Transl. into ENGLISH from the French report AGARD-LS-61

(Contract NASw-2481)

(NASA-TT-F-15661; AGARD-LS-61) Avail: NTIS HC $7.25 CSCL 20F

An account is given of what must be known in order to take up the study of marine optics: definition of the parameters permitting characterization of the optical properties of a disturbed medium like seawater, optical properties of pure water (which constitutes a convenient point of departure), optical effects of suspended materials, what is presently known about the spatial and temporal distributions of the optical properties of seawater (in particular about their variations with depth) and the refractive index of seawater. Author

N74-28136*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

FLUORESCENCE AND PHOSPHORESCENCE OF PHOTOMULTIPLIER WINDOW MATERIALS UNDER ELECTRON IRRADIATION

W. Viehmann, A. G. Eubanks, and J. H. Bredekamp Jul. 1974 38 p refs Submitted for publication

(NASA-TM-X-70695; X-755-74-210) Avail: NTIS HC $5.00 CSCL 20F

The fluorescence and phosphorescence of photomultiplier window materials under electron irradiation were investigated using a Sr-90/Y-90 beta emitter as the electron source. Spectral emission curves of UV grade, optical grade, and electron-irradiated samples of MGF2 and LiF, CaF2, BaF2, sapphire, fused silica, and UV transmitting glasses were obtained over the spectral range of 200 nm to 650 nm. Fluorescence yields, expressed as the number of counts in a solid angle of 2 pi steradian per 1MeV of incident electron energy deposited, were determined on these materials utilizing photomultiplier tubes with cesium telluride, bialkali, and trialkali (S-20) photocathodes, respectively. Author

N74-28137# Technischen Universitaet, Munich (West Germany). Lab. fuer Reaktorregelung und Anlagensicherung.

SWING-R: A DIGITAL COMPUTER PROGRAM FOR CALCULATING THE TIME HISTORY OF THE MOTION OF MULTI-DEGREE-OF-FREEDOM SYSTEMS CONSIDERING NONLINEARITY AND SOLID-STATE FRICTION

B. Oesterle Jul. 1973 60 p refs In GERMAN

(MRR-127) Avail: AEC Depository Libraries HC $5.00

The computer code SWING-R calculates the time history of the space-coordinates, velocities and accelerations of multi-degree-of-freedom systems up to 10 deg of freedom. It is possible to consider: (1) any number of couplings between the masses (springs, dashpots); (2) any exciting force (periodic, nonperiodic); (3) nonlinear (stepwise linear) springs; and (4) friction between pairs of masses (consideration of static and kinetic friction). The theory of the program is presented. NSA

N74-28138# Oak Ridge National Lab., Tenn. Cryoelectrics Section.

CRYOGENIC POWER TRANSMISSION TECHNOLOGY: CRYOGENIC DIELECTRICS Quarterly Report, 1 Jul. - 30 Sep. 1973

Jan. 1974 16 p refs

(Contract W-7405-eng-26)

(ORNL-TM-4433) Avail: NTIS HC $3.00

The investigation of the dielectric properties of fluids and solids for use in superconducting systems is reported. The objectives of the project are identified to be the determination of scaling laws applicable to various models of superconducting cables and other cryogenic apparatus. Studies include the investigation of: (1) ac and dc breakdown and prebreakdown phenomena in liquid helium, and in a variety of solids in liquid helium; (2) the influence of electrode surfaces and impurities; (3) the influence of pressure and temperature on the dielectric properties of liquid helium; (4) the behavior at large gaps; (5) breakdown and surface flashover of bulk and laminated solids. Impulse measurements are also planned. Author (NSA)

N74-28139# California Univ., Livermore. Lawrence Livermore Lab.

HIGH-RESOLUTION OPTICAL IMAGING ON THERMOPLASTIC FILM

E. S. Chambers, H. J. Hsieh, E. L. Lee, and J. J. Boogaard 16 Nov. 1973 18 p refs

(Contract W-7405-eng-48)

(UCID-16383) Avail: NTIS HC $3.00

Experimental details of a novel method for recording optical images is presented. In this method, a photoconductive layer arranges electric charges according to the optical image projected onto it. The differential electric fields thus produced, squeeze a thermoplastic layer into ridges that constitute the final image. The interference of two laser beams that formed an optical image of 1000 cycles/mm was clearly and accurately recorded. The spatial frequency response differs from the conventional photographic method and is well suited for holograms. The image can be erased and the medium reused many times. The thermoplastic layer alone can be written on by charges applied by touching with a thin wire. Author (NSA)

N74-28140# Columbia Univ., New York.

APPLICATION OF CONFORMAL SYMMETRY TO QUANTUM ELECTRODYNAMICS

N. Christ 1973 35 p refs Sponsored by AEC

(COO-2271-21) Avail: NTIS HC $3.75

Conformal symmetry is used to determine the position space vertex function of massless quantum electrodynamics in terms of the current-current correlation function and coefficients appearing in the Wilson expansion of the product of Fermi fields. This relation holds order by order in perturbation theory for graphs containing a single electron line, evaluated in a special position dependent gauge. The relation provides an explicit and perhaps simplified method for computing the vacuum polarization amplitude and is used to analyze the behavior of single electron loop amplitudes in quantum electrodynamics for values of the coupling constant. Author (NSA)

N74-28141# Michigan State Univ., East Lansing. Dept. of Physics.

HELIUM 2 FILM TRANSFER RATES FOR SOLID-ARGON BEAKERS Ph.D. Thesis
T. O. Milbrodt 1973 66 p refs Sponsored by AEC and NSF
(COO-1574-33) Avail: NTIS HC $5.50

Helium II film transfer rates were measured for filling and for emptying beakers of solid argon. Liquid argon was frozen slowly in a mold which was later removed, leaving free-standing, transparent solid-argon beakers. The beakers used were of 3 mm ID, 5mm OD, and 3.5 cm in height. Experiments were carried out in the temperature range 1.45 to 2.0 K. The dependence of the transfer rate on the difference between the inner and outer helium levels Z, height of the beaker lip above the level of the liquid source H, and temperature, were studied. The transfer rates were lower than those observed with glass beakers, in agreement with theory. Author (NSA)

N74-28142# Tennessee Univ., Knoxville. Ultrasonics Lab.
STUDIES OF NONLINEAR ULTRASONIC PHENOMENA
M. A. Breazeale Feb. 1974 82 p refs
(Contract N00014-71-A-0121-0001; NR Proj. 384-306)
(AD-777128; TR-11) Avail: NTIS CSCL 20/1

The report contains an accumulation of results, many of which are in process of being published. Topics covered include: excitation of fractional harmonic ultrasonic waves; parametric phenomena in physics; Bragg imaging with finite amplitude ultrasonic waves; redistribution of a Gaussian ultrasonic beam reflected from a liquid-solid interface; determination of harmonic content of an ultrasonic wave from the asymmetry of the light diffraction pattern; and comparison of methods for absolute calibration of ultrasonic fields. Author (GRA)

N74-28143# Scripps Institution of Oceanography, San Diego, Calif. Visibility Lab.
COMPUTER SIMULATIONS AND PROCESSING OF DEGRADED IMAGES Final Report
Benjamin I. McGlamery 30 Nov. 1973 45 p refs
(Contract F30602-73-C-0280; AF Proj. 2646)
(AD-777900; RADC-TR-74-65) Avail: NTIS CSCL 20/6

The report presents the results of a computer simulation study to test the usefulness of the application of post detection image processing techniques to images degraded by atmospheric turbulence. The major conditions used as a basis for the study were: sun-illuminated object in low earth orbit, point spread function known by use of a reference point source, isoplanatic condition satisfied, quantum limited photodetector, and processing of the recorded degraded image by means of a modified least squares filter. In addition the effects of reduced image signal-to-noise ratio, spectral mismatch between the object and reference point source, defocus of the point spread function, and object orientation were considered. The results of the study are given in photographs which show the appearance of the computer degraded and processed images as a function of the various parameters involved in the study. Author (GRA)

N74-28144# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
THE UNIVERSAL BIREFRINGENT FILTER AT SACRAMENTO PEAK Interim Report
J. M. Beckers 2 Nov. 1973 11 p
(AD-778107; AFCRL-TR-73-0664) Avail: NTIS CSCL 20/6

Recent developments in the construction of achromatic wave-plates here made it possible to make Lyot filters which are tunable over a wide spectral range. Zeiss (Oberkochen) and Spectra-Optics (La Crescenta, CA) have constructed such a Universal Birefringent Filter which is tunable from 4200 A to 7000 A with a bandpass ranging from 40 mA at 4200 A to 130 mA at 7000 A. The wavelength tuning of this filter is done by means of computer control. The optical system, of which the filter is a part, will also include polarizing beamsplitters which will enable velocity and magnetic field observations. All variable elements are under computer control so that one can obtain in each 30 second interval six observations consisting of any combination of filtergrams, tachograms and magnetograms in any lines in the filter wavelength regions. Preliminary results of the Universal Filter observations are presented. Author (GRA)

N74-28145# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SUPER-RADIATION OF CONDENSED XENON DURING EXCITATION WITH FAST ELECTRONS
N. G. Basov, O. V. Bogdankevich, V. A. Danilychev, G. N. Kashnikov, and O. M. Kerimov 26 Mar. 1974 12 p refs Transl. into ENGLISH from Vysokomol. Soedin., Ser. B (USSR), no. 7, 1970 p 68-74
(FTD Proj. T74-05-14)
(AD-777701; FTD-HT-23-272-24) Avail: NTIS CSCL 07/4

The article discusses the super-radiation (1760 A) of liquid xenon which has been excited by a powerful electron beam.
GRA

N74-28146# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE PRODUCTION AND EVALUATION OF DICHROMATED HOLOGRAPHIC LENSES M.S. Thesis
Johnny D. Hovis Mar. 1974 68 p refs
(AF Proj. 7184)
(AD-777845; GEP/PH/74M-8) Avail: NTIS CSCL 20/6

An experimental study was made to determine the optimum procedure for making dichromated reflection holographic lenses from chemically cleared Kodak 649F spectroscopic plates. The absorption spectral curve showed a sensitivity range from 3500 A to about 5500 A with the peak below 4000A. A 15-watt red safe light was used when sensitizing film with no fogging effects. Exposure curves showed a near linear relationship with the square-root of diffraction efficiency over a range from 20 to 40 mJ/sq cm. Ronchi rulings on glass slides and on photographic transparencies were used to measure square wave response. GRA

N74-28284* Kanner (Leo) Associates, Redwood City, Calif.
PROBLEM OF SELECTING OPTIMAL REGIMES FOR STORAGE OF CRYOGENIC AGENTS
R. S. Mikhalchenko, V. F. Getmanets, and Yu. V. Iskhakov *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 139-154 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 91-101
(For availability see N74-28272 17-30)
CSCL 20K

N74-28364* Kanner (Leo) Associates, Redwood City, Calif.
SOME PROBLEMS OF MODERN ACOUSTICS
A. Stan *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 1-8 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 17-25 (For availability see N74-28363 17-32)
CSCL 20A

N74-28385* Kanner (Leo) Associates, Redwood City, Calif.
DATA ON THE NOISE VIBRATIONS OF MODERN TRACTION LOCOMOTIVES
Vasile Paslaru, Andrei Popescu, and R. Vrasti *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 136-142 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 181-186 (For availability see N74-28363 17-32)
CSCL 11F

N74-28387* Kanner (Leo) Associates, Redwood City, Calif.
CALCULATION METHOD FOR ACTIVE SILENCERS WITH A VARIABLE SECTION
Vergiliu Marinescu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 150-155 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 199-203 (For availability see N74-28363 17-32)
CSCL 20A

N74-28389* Kanner (Leo) Associates, Redwood City, Calif.
THE PROBLEM OF NOISE IN WEAVING MILLS
T. Georgescu, E. Harastaseanu, and F. Mercea *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 163-169 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea

Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 213-219 (For availability see N74-28363 17-32)
CSCL 20A

N74-28392* Kanner (Leo) Associates, Redwood City, Calif.
MEASURES FOR THE REDUCTION OF THE NOISE AND VIBRATION LEVEL OF APARTMENT HOUSE ELEVATORS
N. Enescu, M. Munteanu, and A. Stan *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 182-186 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 239-243 (For availability see N74-28363 17-32)
CSCL 20A

N74-28393* Kanner (Leo) Associates, Redwood City, Calif.
REDUCTION OF NOISE GENERATED BY AIR CONDITIONING AND VENTILATION PLANTS AND TRANSMITTED TO INHABITED AREAS
E. Harastaseanu, G. Cristescu, and F. Mercea *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 187-197 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 245-258 (For availability see N74-28363 17-32)
CSCL 20A

N74-28401* Kanner (Leo) Associates, Redwood City, Calif.
ACOUSTIC WAVE TRANSMISSION THROUGH MULTILAYER LAYER
C. Salceanu and V. Bacria *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 238-245 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 307-312 (For availability see N74-28363 17-32)
CSCL 20A

N74-28403* Kanner (Leo) Associates, Redwood City, Calif.
DIFFERENTIAL PHONOGRAMS
Erich Halpert and Nicolas Beuran *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 254-258 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 325-329 (For availability see N74-28363 17-32)
CSCL 20A

N74-28404* Kanner (Leo) Associates, Redwood City, Calif.
PRESENT TENDENCIES IN EQUIPMENT NOISE NORMALIZATION
Anna Sternberg *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 259-265 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 331-338 (For availability see N74-28363 17-32)
CSCL 20A

24 PHYSICS, ATOMIC, MOLECULAR, AND NUCLEAR

Includes atomic, molecular and nuclear physics. For applications see: 22 Nuclear Engineering. For related information see also: 29 Space Radiation.

N74-28147 Rensselaer Polytechnic Inst., Troy, N.Y.
DIFFERENTIAL ELASTIC SCATTERING CROSS SECTIONS OF keV NEUTRONS FROM IRON AND NICKEL Ph.D. Thesis
Raymond A. Zuhr 1974 184 p
Avail: Univ. Microfilms Order No. 74-12807

Differential elastic scattering cross sections of neutrons from natural iron and nickel samples were measured in the energy region from 5 to 650 keV. The experiment used the pulsed source of photoneutrons provided by the R.P.I. linear electron accelerator, with neutron energies being determined by time of flight spectroscopy. The measurements were made at six angles ranging from 30 to 150 degrees, and the differential cross sections were determined relative to the known cross sections of a lead standard sample. The principal angular distribution results are presented in terms of the Legendre polynomial expansion coefficients as functions of energy. Two sets of coefficients corresponding to averaged values over 20 and 50 keV are given. Comparisons are made with the available data on total and differential scattering cross sections. The data are consistent with the interpretation that s-wave scattering is dominant throughout the region of measurement, while p-wave scattering becomes evident above 250 keV. Dissert. Abstr.

N74-28148 Rensselaer Polytechnic Inst., Troy, N.Y.
KINETICS OF INTERSTELLAR GRAIN ORIENTATION Ph.D. Thesis
Edward G. Derringh 1973 153 p
Avail: Univ. Microfilms Order No. 74-12782

A transformation of the Fokker-Planck equation from its usual form, in cartesian momenta, to one especially suited for investigations of interstellar grain orientation was carried out. In this equation the distribution function is written in variables describing two coupled spherical coordinate systems: one fixed in the grain, and the other fixed in space. Several situations were studied. First, for spheroidal grains interacting with atoms of a surrounding Maxwellian gas the expected Maxwell-Boltzmann distribution of orientations was found. A solution of the Fokker-Planck equation was obtained also for homogeneous, spheroidal grains rotating in a uniform magnetic field with no gas present. For grains in a gas and magnetic field, several characteristics of the alignment were obtained by analytical studies of the Fokker-Planck equation. Finally, the orientation of spherical grains in a uniform flow, or stream, of atoms (Gold mechanism) is investigated and applied to hypothetical, spherical zodiacal light particles. Dissert. Abstr.

N74-28149# Maryland Univ., College Park. Center for Theoretical Physics.
LEFT-RIGHT GAUGE SYMMETRY AND AN ISO-CONJUGATE MODEL OF CP-VIOLATION
Rabindra N. Mohapatra and Jogesh C. Pati Mar. 1974 12 p refs
(Grant NSF GP-20709)
(TR-74-085) Avail: NTIS HC $4.00

Left-right symmetry in the starting gage interactions provides the basis for an iso-conjugate model of CP-violation. The magnitude of CP-violation is naturally suppressed at least to the extent that V + A interactions are suppressed compared to the V - A interactions. Attempts were made to point out that a particularly simple scheme of CP-violation distinct from previous attempts and satisfying the said relation may be realized within a gage theory of the weak, electromagnetic, and strong interactions by assuming that the left and right handed gages enter into the theory in a symmetrical fashion, the corresponding currents being coupled to distinct gage mesons W sub L and W sub R. Author

N74-28150*# Nebraska Univ., Lincoln. Vacuum UV Lab.
PHOTOIONIZATION BRANCHING RATIOS AND VIBRATIONAL INTENSITY DISTRIBUTION FOR N2, CO; AND CO2 BETWEEN 53 AND 75 nm
James A. R. Samson and J. L. Gardner [1973] 74 p refs
(Grant NGR-28-004-021)
(NASA-CR-138733; TR-1) Avail: NTIS HC $6.75 CSCL 20H

The probability of radiation producing ions in specific electronic and vibrational levels was documented. For example, when a narrow band-pass of solar ionizing photons is incident on an atmospheric species it is now possible to describe, accurately, how the radiant energy is shared among the various electronic states of the ions produced. The molecules studied were N2, CO, and CO2. These molecules were photoionized by radiation between 53 and 75 nm. The effects of autoionization are discussed and continuum vibrational intensities are tabulated and compared with theoretical Franck-Condon factors where available. The branching ratios and partial cross sections for ionization into various electronic states are tabulated. Author

N74-28151*# California Univ., La Jolla. Dept. of Chemistry.
FISSION PRODUCTS OF SUPERHEAVY ELEMENTS. AN INVESTIGATION OF THE NATURALLY OCCURRING FISSION PRODUCTS OF ELEMENTS HEAVIER THAN URANIUM Final Report, 1 Apr. 1971 - 1 Apr. 1972
Kurt Marti 1972 7 p refs
(Grant NGR-05-009-170)
(NASA-CR-138798) Avail: NTIS HC $4.00 CSCL 18G

Fission mass yields in different structural elements and mineral separates were studied for the element X. The fission component for Pu-244, and the element X are discussed along with radiogenic Xe-129 and neutron activitation. F.O.S.

N74-28152# Scientific Translation Service, Santa Barbara, Calif.
CALCULATION OF AEROSOL PARTICLE ROTATION RATE AND TIME IN AN ELECTROSTATIC FIELD
A. A. Podolskii, V. I. Turubarov, and E. I. Pominov 1974 10 p refs Transl. into ENGLISH from Kolloion, Zh. (Moscow), v. 35, no. 1, 1973 p 63-68 Sponsored by EPA
(APTIC-50066; TR-150-74) Avail: NTIS HC $4.00

The nature of particle motion during the orientation process in electrostatic field was analyzed. Estimates were also made of the rotation rate and rotation time as a function of field intensity and particle parameters. Author

N74-28153*# Analytical Mechanics Associates, Inc., Seabrook, Md.
RELATIVE MOTION OF ORBITING PARTICLES UNDER THE INFLUENCE OF PERTURBING FORCES. VOLUME 1: SUMMARY
J. B. Eades, Jr. Jan. 1974 82 p refs
(Contract NAS1-11990)
(NASA-CR-132410-1; Rept-74-2) Avail: NTIS HC $7.25 CSCL 20H

The relative motion for orbiting vehicles, under the influence of various perturbing forces, has been studied to determine what influence these inputs, and others, can have. The analytical tasks are discribed in general terms; the force types considered, are outlined modelled and simulated, and the capabilities of the computer programs which have evolved in support of this work are denoted. Author

N74-28154*# Analytical Mechanics Associates, Inc., Seabrook, Md.
RELATIVE MOTION OF ORBITING PARTICLES UNDER THE INFLUENCE OF PERTURBING FORCES. VOLUME 2: ANALYTICAL RESULTS
J. B. Eades, Jr. Jan. 1974 215 p refs
(Contract NAS1-11990)
(NASA-CR-132410-2; Rept-74-3) Avail: NTIS HC $13.75 CSCL 20H

The mathematical developments carried out for this investigation are reported. In addition to describing and discussing the solutions which were acquired, there are compendia of data presented herein which summarize the equations and describe them as representative trace geometries. In this analysis the relative motion problems have been referred to two particular frames of reference, one which is inertially aligned, and one which is (local) horizon oriented. In addition to obtaining the classical initial values solutions, there are results which describe cases having applied specific forces serving as forcing functions. Also, in order to provide a complete state representation the speed components, as well as the displacements, have been described. These coordinates are traced on representative planes analogous to the displacement geometries. By this procedure a complete description of a relative motion is developed, and, as a consequence range rate as well as range information is obtained. Author

N74-28155*# Analytical Mechanics Associates, Inc., Seabrook, Md.
RELATIVE MOTION OF ORBITING PARTICLES UNDER THE INFLUENCE OF PERTURBING FORCES. VOLUME 3: CONSTRUCTION OF RELATIVE MOTION TRACES
J. B. Eades, Jr. Aug. 1973 106 p
(Contract NAS1-11990)
(NASA-CR-132410-3; Rept-73-39) Avail: NTIS HC $8.50 CSCL 20H

Geometric traces can be simply constructed to illustrate the relative motions experienced by particles in a number of problem situations. These diagrams describe the displacements and hodographs which arise as a consequence of initial value inputs and selected disturbance (force) conditions. Due to the linearization which is imposed on the mathematical formulation there is a separation of the in-plane and out-of-plane coordinate solutions. The construction of in-plane traces is easier to represent and to visualize. The out-of-plane geometries are the more complicated cases and generally need some added specializations in order to acquire figures which have some degree of symmetry and simplicity. Author

N74-28156*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CHARGED PARTICLE RADIATION ENVIRONMENT FOR THE LST
John W. Watts, Jr., M. O. Burrell, and J. J. Wright May 1974 18 p refs
(NASA-TM-X-64858) Avail: NTIS HC $3.00 CSCL 20H

Preliminary charged particle dose rates are presented for the LST orbit. The trapped proton component appears to dominate the total dose for the expected shielding available. Typical dose rates should range from 400 to 800 millirads/day. Author

N74-28157*# Linguistic Systems, Inc., Cambridge, Mass.
THE BIOPHYSICS OF STRONG INTERACTIONS OF HIGH ENERGY HADRONS
I. G. Akoyev and S. S. Yurov Washington NASA Dec. 1973 61 p refs Transl. into ENGLISH from "K Biofizike Sil'nykh Vzaimodeystiviy Andronov Vysokikh Energy" USSR Acad. of Sci., Sci. Center for Biol. Res, Preprint, Pushchinona-Oke, 1973 32 p
(Contract NASw-2482)
(NASA-TT-F-15194) Avail: NTIS HC $6.25 CSCL 06R

The effect of high and super high energy hadrons on the functions and genetic structures of different organisms is discussed. Materials from studies performed on a 70 GeV proton accelerator, with a source of gamma radiation and material from various Soviet and American space studies were used. Although the research conducted showed that the effect of the strong interactions of high energy hadrons can cause significant damage to cellular and genetic structures, radiation-protective measures may prove to be effective. Author

N74-28158# Maryland Univ., College Park. Dept. of Physics and Astronomy.
FLUX QUANTIZATION AND FRACTIONAL CHARGES OF QUARKS
Herbert Jehle 1974 33 p refs Prepared in cooperation with Max-Planck-Inst. fuer Phys. und Astrophys., Munich
(TR-74-095; MPI-PAE/PTH-14) Avail: NTIS HC $4.75

Superposition of a continuous manifold of loopforms, or the alternative forms which one quantized magnetic flux loop might adopt are considered for an electron as well as a quark. An analysis of the types of flux loops and of their modes of spinning and whirling were studied to find the relationship between the loop of an integer-charge lepton and the loop of a fractional-charge quark. It is shown that a consistent model exists which substantiates the claim that these elementary loops are the basic units of particle physics. Simple topological properties of various types of loops, and of linked pairs and triplets of loops, are shown to characterize leptons, mesons, and baryons. It is concluded that the difference between electromagnetic, strong, and weak interactions is essentially one of the topology of interaction of flux loops. Author

N74-28159# Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
PHYSICS DIVISION PROGRESS REPORT, 1 APRIL - 30 JUNE 1973
Jul. 1973 87 p refs
(AECL-4595; PR-P-98) Avail: AEC Depository Libraries HC $6.50; Atomic energy of Can., Ltd., Chalk River $2.00

This report, administrative in nature, contains sections prepared by the nuclear physics, neutron and solid state physics, theoretical physics, and mathematics and computation branches. Areas of special concentration include tandem operation, nuclear

physics research with heavy ions, solid state studies with neutron scattering and positron annihilation, development of solid state detectors, and applied studies and computation. NSA

N74-28160# Sandia Labs., Albuquerque, N.Mex.
PARTIAL COMPARISON BETWEEN THE SIMILARITY AND SUMMATION TECHNIQUES FOR MULTIPLE-BURST INTERACTIONS
D. A. Dahlgren Nov. 1973 20 p refs
(Contract AT(29-1)-789)
(SLA-73-899) Avail: NTIS HC $3.00

A comparison between the similarity and summation techniques for multiple-burst interaction indicates that the similarity technique is superior for the situations considered. A model which is a substantial improvement on the shock-wave interaction test problem is suggested. Gross errors are demonstrated for the definition of a shock wave in a fireball which could impact vehicle dynamics. Author (NSA)

N74-28161# Sandia Labs., Albuquerque, N.Mex.
BEHAVIOR OF SOLID TARGETS IRRADIATED BY FOCUSED RELATIVISTIC ELECTRON BEAMS
M. J. Clauser, A. J. Toepfer, and J. R. Freeman 1973 22 p refs Presented at Ann. Plasma Phys. Meeting of the Am. Phys. Soc., Philadelphia, 31 Oct. 1973 Sponsored by AEC
(SLA-73-5700; Conf-731009-5) Avail: NTIS HC $3.25

With the demonstration that high Nu/gamma electron beams can be focused to produce fluxes of at least 10 to the 12th power w/sq cm, one of the barriers in the way of electron-beam-initiated fusion in solid targets is greatly reduced. Several schemes are considered in the design of e-beam fusion pellets; the simplest pellet is a D-T droplet. This scheme requires that the beam energy be deposited in the outer portion of the droplet by an anomalous range-shortening mechanism, and also requires that the pulse be rather precisely tailored so that the majority of the energy arrives during the last fraction of a nanosecond. More complex targets have been suggested by several authors. For example, at the Moscow conference, Rudakov proposed using a pellet consisting of a high-density hollow shell containing DT gas. The pellet is irradiated by a single electron beam that passes through the entire pellet, heating the shell uniformly. The shell then implodes into the DT gas, compressing and heating it. These suggestions are discussed. NSA

N74-28162# Centre National de la Recherche Scientifique, Marseilles (France). Centre de Physique Theorique.
MODEL FOR SPIN PARTICLES IN THE ELECTROMAGNETIC AND GRAVITATIONAL FIELD
J. M. Souriau Jun. 1973 88 p refs In FRENCH
(CNRS-CPT-73-P-546) Avail: AEC Depository Libraries HC $6.50

A universal particle model was constructed in which it is assumed that the dipolar moments reduce to a kinetic moment and a magnetic moment in a momentum frame. In this way, a deterministic model is obtained for the elementary particles. The elementary particle is defined only in terms of the parameters appearing in the universal model i.e. momentum, spin charge, and the electromagnetic moment. The model meets the following requirements: conformity with the universal electrodynamical equations (hyperspace formulas), determinism of the differential system, and existence of a symplectic structure and a prequantum structure. In addition, this model enables a description to be obtained of all the point (or complex particle) systems such as electrons, molecules, or stars as far as it is possible to neglect the quadrupolar moments. Author (NSA)

N74-28163# Oak Ridge Gaseous Diffusion Plant, Tenn.
RAREFIED FLOW AND DIFFUSION OF NEON ISOTOPES
D. E. Fain and W. K. Brown 9 Nov. 1973 13 p refs Presented at Meeting of the Fluid Dyn. Div., New Haven, 19 Nov. 1973 Sponsored by AEC
(K-L-6332; Conf-731129-1) Avail: NTIS HC $3.00

A comprehensive study of the variation in the separation efficiency of neon isotopes by gaseous diffusion as a function of pressure with three significantly different types of geometrical flow channels was made. The experimental apparatus for performing the study and some results are described. A large body of data was collected. A complete description of the work is presently in publication. NSA

N74-28164# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDY OF THE REGULARITIES IN THE WASHING OUT OF RADIOACTIVE FISSION PRODUCTION IN MOUNTAINS AND FOOTHILLS
M. A. Tsevelev, P. I. Chalov, and K. P. Makhonko 25 Mar. 1974 23 p refs Transl. into ENGLISH from Tr. Inst. Eksp. Meteorol. (Moscow), no. 5, 1970 p 102-115
(AD-777682; FTD-HT-23-927-74) Avail: NTIS CSCL 18/8

A method for measuring radioactive products in precipitation is introduced. Attempts were made to determine fission product irregularities, beta activity, and gamma activity. Aerosol samples were taken by an FFP 15 filter and gamma activity measurements were made by a scintillation analyzer. Statistical errors in radioactivity measurements did not exceed 3%. E.H.W.

N74-28165# Wisconsin Univ., Madison. Dept. of Physics.
EXCITATION BY ELECTRONIC AND ATOMIC COLLISIONS OF RARE GASES OCCURRING IN THE ATMOSPHERE Final Report, 16 Jan. 1969 - 31 Dec. 1973
Chun C. Lin 14 Feb. 1974 10 p refs
(Grant AF-AFOSR-1670-69; AF Proj. 9767)
(AD-777287; AFOSR-74-0463TR) Avail: NTIS CSCL 07/4

A theoretical scheme for characterizing the excitation functions and cross sections of neon has been developed. The results are in good agreement with experiment. Electron excitation functions of some 30 states of argon have been measured, and the results can be explained by extending the theoretical scheme described above. The ionization-excitation cross sections of He to the 4s,p,d,f, states of He(+) have been measured. Electron excitation functions of some 15 states of potassium have been measured. Electron excitation cross sections of individual magnetic sublevels of 4 doublet P(3/2) of K have been measured. (Modified author abstract) GRA

25 PHYSICS, PLASMA

Includes magnetohydrodynamics. For applications see: 28 Propulsion Systems.

N74-28166 Princeton Univ., N.J.
ON THE THEORY OF FLUCTUATIONS IN PLASMA Ph.D. Thesis
Edward Aston Williams 1973 121 p
Avail: Univ. Microfilms Order No. 74-9733

The theory of fluctuations in plasmas was extended in a number of directions, including the effect of longitudinal bremsstrahlung and the corresponding collisional absorption of the spectrum of fluctuations in the plasmas. In thermal equilibrium, the spectrum is related to the high frequency conductivity of Depree, Coste and Dawson, and Oberman. A kinetic equation was derived for the correlation function of the fluctuating phase space density. By taking moments and using a Chapman-Enskog procedure, it was shown that hydrodynamic fluctuations in a nonequilibrium plasma may be described by a simple modification of the equilibrium theories of Onsager and of Landau and Lifshitz. The spectrum of waves in an inhomogeneous plasma, parametrically excited by an electromagnetic wave with frequency slightly greater than twice the local plasma frequency below the threshold of instability, was derived taking into account wave damping and convection effects. Dissert. Abstr.

N74-28167*# Princeton Univ., N.J. Guggenheim Aerospace Propulsion Lab.
ANODE POWER IN A QUASI-STEADY MPD THRUSTER Ph.D. Thesis
Aaron Jaan Saber May 1974 144 p refs
(Grant NGL-31-001-005)
(NASA-CR-138750; Rept-1128) Avail: NTIS HC $10.25 CSCL 20I

Local anode heat flux in a quasi-steady MPD thruster is measured by thermocouples attached to the inside surface of a shell anode. Over a range of arc currents J from 5.5 to 44

kiloamperes and argon propellant mass flows m from 1 to 48 g/sec, with the ratio J2/m held constant, the fraction of arc power deposited in the anode is found to decrease with increasing arc power. Specifically, this anode power fraction decreases from 50% at 200 kW arc power, to 10% at 20 MW. In an effort to account for this functional behavior, the current density, plasma potential, and electron temperature in the plasma adjacent to the anode are measured with probes, and the results are used in a theoretical anode heat flux model. The model asserts that energy exchange between electrons and heavy particles in the plasma near the anode occur over distances greater than the anode sheath thickness. Author

N74-28168# Joint Publications Research Service, Arlington, Va.
ON THE APPROACHES TO MHD-POWER GENERATION
7 Jun. 1974 24 p refs Transl. into ENGLISH from Nauka Zhizn (Moscow), no. 4, Apr. 1974 p 14-23
(JPRS-62196) Avail: NTIS HC $4.25

A round table discussion on magnetohydrodynamic generation of electric power is reported. Author

N74-28169*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
REPORT OF THE PLASMA PHYSICS AND ENVIRONMENTAL PERTURBATION LABORATORY (PPEPL) WORKING GROUPS. VOLUME 1: PLASMA PROBES, WAKES, AND SHEATHS WORKING GROUP
Mar. 1974 44 p refs 3 Vol.
(NASA-TM-X-64856-Vol-1) Avail: NTIS HC $3.25 CSCL 20I

It is shown in this report that a comprehensive in-situ study of All aspects of the entire zone of disturbance caused by a body in a flowing plasma are studied resulting in a large number of requirements on the shuttle-PPEPL facility. A large amount of necessary in-situ observation can be obtained by adopting appropriate modes of performing the experiments. Requirements are indicated for worthwhile studies, of some aspects of the problems, which can be carried out effectively while imposing relatively few constraints on the early missions. Considerations for the desired growth and improvement of the PPEPL to facilitate more complete studies in later missions are also discussed. For Vol. 2, see N74-28170; for Vol. 3, see N74-28171. Author

N74-28170*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
REPORT OF THE PLASMA PHYSICS AND ENVIRONMENTAL PERTURBATION LABORATORY (PPEPL) WORKING GROUPS. VOLUME 2: WAVE EXPERIMENTS WORKING GROUP
Mar. 1974 52 p 3 Vol.
(NASA-TM-X-64856-Vol-2) Avail: NTIS HC $3.75 CSCL 20I

The area of wave experiments for the PPEPL is considered in broad terms. It was found that most experiments in this area can be classified typically by a few generalized experiments. These experiment possibilities are discussed in terms of advantages, disadvantages, and probable areas for future investigation. It was concluded that the areas where wave experiments have the most promise are wave sources, wave propagation, and nonlinear interactions and should be implemented in that order. It was recommended that the PPEPL facility remain sufficiently flexible to handle new ideas as they appear, and a continuing effort should be made to solicit new ideas and approaches. It was also felt that detailed investigations should begin as soon as possible in the areas of antennas, both conventional and particle types, and wave-particle interaction experiments. For Vol. 1, see N74-28169; for Vol. 3, see N74-28171. Author

N74-28171*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala
REPORT OF THE PLASMA PHYSICS AND ENVIRONMENTAL PERTURBATION LABORATORY (PPEPL) WORKING GROUPS. VOLUME 3: MAGNETOSPHERIC EXPERIMENTS WORKING GROUP
Mar. 1974 70 p refs 3 Vol.
(NASA-TM-X-64856-Vol-3) Avail: NTIS HC $3.75 CSCL 20I

A number of general studies that were proposed for the PPEPL-shuttle program are considered in qualitative detail from both the theoretical and practical points of view. The selection of experimental programs was restricted to those which may be considered active as opposed to refinements of the passive observational programs done previously. It is concluded that, while these new studies were scientifically worthwhile and could be performed in principle, in most cases insufficient attention was paid to the practical details of the experiments. Several specific areas of study, stressing in particular the practical feasibility of the proposed experiments, are recommended. In addition, recommendations are made for further theoretical study, where appropriate. For Vol. 1, see N74-28169; for Vol. 2, see N74-28170. Author

N74-28172*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A THEORETICAL AND EXPERIMENTAL INVESTIGATION OF CYLINDRICAL ELECTROSTATIC PROBES AT ARBITRARY INCIDENCE IN FLOWING PLASMA
Renaldo V. Jenkins and W. Linwood Jones, Jr. Washington Jul. 1974 42 p refs
(NASA-TR-R-425) Avail: NTIS HC $3.25 CSCL 20I

The theory for calculating the current collected by a negatively biased cylindrical electrostatic probe at an arbitrary angle of attack in a weakley ionized flowing plasma is presented. The theory was constructed by considering both random and directed motion simultaneous with dynamic coupling of the flow properties and of the electric field of the probe. This direct approach yielded a theory that is more general than static plasma theories modified to account for flow. Theoretical calculations are compared with experimental electrostatic probe data obtained in the free stream of an arc-heated hypersonic wind tunnel. The theoretical calculations are based on flow conditions and plasma electron densities measured by an independent microwave interferometer technique. In addition, the theory is compared with laboratory and satellite data previously published by other investigators. In each case the comparison gives good agreement. Author

N74-28173# Nagoya Univ. (Japan).
[PLASMA PHYSICS AND DIAGNOSTIC RESEARCH] Annual Review, Apr. 1972 - Mar. 1973
Mar. 1973 165 p refs
Avail: NTIS HC $11.25

The research activities at the Institute of plasma physics are reported. Work in the following areas is included: toroidal confinement of low beta plasma, pinch plasmas, RF plugging and heating, plasma heating, plasma production, dynamic stabilization, laser plasma, spectroscopic study in the extreme ultraviolet and soft X-ray region, and technology and applied plasma physics. F.O.S.

N74-28174# Weapons Research Establishment, Salisbury (Australia).
RESULTS FROM A ROCKET BORNE SWEPT FREQUENCY IONOSPHERIC PLASMA PROBE
K. H. Lloyd and C. J. Beach Jul. 1973 19 p refs
(WRE-TN-978(WR/D)) Avail: NTIS HC $4.00

A swept frequency plasma probe to study the properties of the ionosphere was launched in a Cockatoo rocket on 25th Januaryuary, 1973. The results of the experiment indicated an extended layer of enhanced ionization at 104 km, and layers of reduced ionization at 113 and 122 km, the former being patchy. In addition to the resonance associated with the ambient plasma, additional sharp resonances were observed. These are attributed to the effects of the sheath surrounding the rocket. Author

N74-28175*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ISOLATED COLD PLASMA REGIONS: OBSERVATIONS AND THEIR RELATION TO POSSIBLE PRODUCTION MECHANISMS
N. C. Maynard and A. J. Chen (NAS-NRC) May 1974 20 p refs Submitted for publication
(NASA-TM-X-70686; X-625-74-196) Avail: NTIS HC $4.00 CSCL 20I

Regions of enhanced cold plasma, isolated from the main plasmasphere along the Explorer 45 orbit on the equatorial plane, are reported using the sheath induced potentials seen by the

electric field experiment. The occurrence of these regions has a strong correlation with negative enhancements of Dst, and their locations are primarily in the noon-dusk quadrant. The data support the concept that changes in large scale convection play a dominant role in the formation of these regions. Plasmatails that are predicted from enhancements of large scale convection electric fields in general define where these regions may be found. More localized processes are necessary to account for the exact configuration and structure seen in these regions and may eventually result in detachment from the main plasmasphere.
Author

N74-28176# Ecole Polytechnique Federale de Lausanne (Switzerland).
COLLISIONLESS ION ACOUSTIC SHOCK WAVES IN A TWO-COMPONENT PLASMA
M. Q. Tran, M. Bitter, and P. J. Hirt Oct. 1973 14 p refs
(LRP-68-73) Avail: AEC Depository Libraries HC $3.00

The structure of stationary ion acoustic shocks in a two-component plasma was studied. Unlike the situation in a one-component plasma there exists an oscillatory structure of the trailing edge even for zero ion temperature due to the reflection of light ions. The wavelength and amplitude of these oscillations were calculated in dependence of the Mach number and the concentration of light ions. Author (NSA)

N74-28177# California Univ., Los Angeles.
JOINT EXPERIMENTAL-THEORETICAL PROGRAM IN PLASMA HEATING AND CONTROL Progress Report, 1973
1973 58 p refs
(Contract AT(11-1)-34)
(UCLA-34-P-157-X-7) Avail: NTIS HC $5.00

Research is reported for the following areas: (1) theoretical studies, (2) experiments on plasma properties and heating, (3) laser-plasma studies, and (4) computer simulation. NSA

N74-28178# Ecole Polytechnique Federale de Lausanne (Switzerland).
NONLINEAR WAVE PROPAGATION FOR A SLIGHTLY INHOMOGENEOUS PLASMA
E. S. Weibel Oct. 1973 11 p refs
(LRP-69-73) Avail: AEC Depository Libraries HC $3.00

A medium which may be slightly inhomogeneous in space and time is characterized by its current response. A system of equations describing the linear and nonlinear coupling of WKB modes is derived. Author (NSA)

N74-28179# Ecole Polytechnique Federale de Lausanne (Switzerland).
KORTEWEG-DE VRIES EQUATION FOR A TWO-COMPONENT PLASMA
M. Q. Tran and P. J. Hirt Sep. 1973 11 p refs
(LRP-67-73) Avail: AEC Depository Libraries HC $3.00

A Korteweg-de Vries equation for a two component-plasma with cold ions and isothermal electrons is derived. The amplitude of the solitons is reduced drastically by a few percent of light ions, and an initial perturbation breaks up into more solitons than in a one-component plasma. Author (NSA)

N74-28180# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucleaires.
MEASUREMENT OF THE PROFILE OF ELECTRON DENSITY IN AN INHOMOGENEOUS PLASMA
J. P. Crenn [1973] 15 p refs In FRENCH Presented at 1st French-Spanish Colloq. on Microwaves Meeting, Madrid, 21-25 May 1973
(CEA-Conf-2314; Conf-730551-1) Avail: AEC Depository Libraries HC $3.00

The electron density profile in an inhomogeneous plasma was measured using a ten-path hyperfrequency interferometer operating at a frequency of 140 GHz. This interferometer is described. The principle of the interferometric measurement is outlined. The measurements are based on a dephasing between the measurement path and a reference path. The factors governing the selection of the wavelength and of the number of channels are discussed. The associated electronics are described. NSA

N74-28181# Flinders Univ., Bedford Park (Australia). School of Physical Sciences.
PROPAGATION OF COMPRESSIONAL ALFVEN WAVES IN NONUNIFORM PLASMAS
R. Morrow and M. H. Brennan Aug. 1973 35 p refs
(FUPH-R-91) Avail: AEC Depository Libraries HC $3.75

A theoretical treatment is presented for the propagation of Alfven waves in a plasma including the effects of resistivity, ion-neutral collisions, the ion cyclotron frequency, and radial nonuniformities in ion density, neutral-particle density, and temperature. The theory is applied to plasmas with conducting and nonconducting walls and compared with results of experiments conducted in the afterglow of a shock-produced plasma. Nonuniformity in the ion density is found to have a marked effect on the dispersion relation and wave-field profiles. Nonuniformities in the total particle density and temperature are less important. Excellent agreement is obtained between theory and experiment, allowing unambiguous and accurate determinations to be made of the average total particle density, which is found to be approximately 50% of the initial filling density, and the cross section for momentum transfer between protons and hydrogen atoms. Author (NSA)

N74-28182# California Univ., Livermore. Lawrence Livermore Lab.
APPARATUS FOR TESTING DIRECT ENERGY CONVERSION OF PLASMA ENERGY TO ELECTRICITY
W. L. Barr, M. O. Calderon, T. N. Haratani, J. D. Kinney, R. W. Moir, and R. R. Smith 6 Nov. 1973 13 p refs Presented at 5th Sym. on Eng. Problems of Fusion Res., Princeton, N. J., 6 Nov. 1973 Sponsored by AEC
(UCRL-75174; Conf-731114-25) Avail: NTIS HC $3.00

The program for research and development of direct energy conversion for fusion reactor application is described. A test facility consisting of a system of magnets, a vacuum chamber, and collector structure of unusual shapes and sizes is also described. Under laboratory conditions, the anticipated collection efficiencies are 65% for a 2-stage venetian blind collector concept and 89 to 90% for a 22-stage periodic focusing concept. Because of space charge considerations, the venetian blind concept appears to be appropriate in the 100- to 200-keV ion energy range whereas the periodic focusing concept is more interesting in the 500- to 800-keV range. Author (NSA)

N74-28183# United Aircraft Corp., East Hartford, Conn. Research Labs.
HIGH-BETA CAPTURE AND MIRROR CONFINEMENT OF LASER-PRODUCED PLASMAS Semiannual Report, 1 Feb. - 31 Jul. 1973
A. F. Haught, D. H. Polk, J. T. Woo, W. J. Fader, R. G. Tomlinson, R. A. Jong, and W. B. Ard 31 Jul. 1973 62 p refs
(Contract AT(11-1)-2277)
(COO-2277-2; UARL-M-921514-19) Avail: NTIS HC $5.25

This program investigates the use of a dense, mirror-confined, laser-produced plasma as the target for a neutral-injection beam and to examine this technique for establishing and maintaining a high-temperature, high-density, steady-state, mirror-confined fusion plasma. The program is a direct extension of the current UARL investigations of the capture and confinement of laser-produced plasmas in a minimum-B mirror field. The overall program plan of the UARL laser-initiated target experiment involves four parts. Author (NSA)

N74-28184# Academy of Sciences (USSR), Leningrad.
ANOMALOUS ABSORPTION OF MICROWAVES BY PLASMA NEAR THE UPPER HYBRID FREQUENCY
A. I. Anisimov, N. I. Vinogradov, and B. P. Poloskin 1973 11 p refs In RUSSIAN; ENGLISH summary
(NP-19920) Avail: AEC Depository Libraries HC $3.00

The interaction of microwaves with a plasma obtained in a toroidal chamber was investigated. It was found that wave absorption was localized in the regions where plasma density and magnetic field met the upper hybrid resonance condition. The dimension of the absorption region was independent of neutral gas pressure. In the absorption region the low-frequency oscillations were observed which seemed to be ion-acoustic. The conclusion is made that the absorption is due to parametric instability. Author (NSA)

N74-28185# Academy of Sciences (USSR), Moscow. Fizicheskij Inst.
INTERACTION OF MICROWAVE RADIATION WITH A STREAM OF COLLISIONLESS PLASMA INSULATED FROM WAVEGUIDE WALLS
V. I. Barinov, I. R. Gekker, V. A. Ivanov, and D. M. Karfidov 1973 16 p refs In RUSSIAN Presented at 11th Intern. Conf. on Phenomena in Ionized Gases, 10-14 Sep. 1973
(NP-19926) Avail: AEC Depository Libraries HC $3.00

A hydrogen-carbon plasma was injected into a metal waveguide through a diaphragm which restricted the transverse dimension of the plasma stream. The diaphragm had a metal grid and was placed at a distance of 60 cm from the source. A pulsed microwave generator was switched on when the plasma front was 6 to 7 cm from the diaphragm. Microwave absorption and reflection measurements are described. It is shown that wall effects do not play a dominant role in anomalous dissipation of microwaves in plasma. Author (NSA)

N74-28186*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A MODEL OF THE EFFECT OF THE SATELLITE PHOTOSHEATH ON A DOUBLE FLOATING PROBE SYSTEM Technical Report, Jul. 1971 - Jul. 1973
David P. Cauffman and Nelson C. Maynard 19 Mar. 1974 50 p refs Prepared in cooperation with Aerospace Corp., El Segundo, Calif.
(Contracts F04701-73-C-0074; F04701-72-C-0073)
(NASA-TM-X-70188; SAMSO-TR-74-64; AD-777167; TR-0074(9260-08)-2) Avail: NTIS HC $5.50 CSCL 20/9

The report describes a model developed to predict the interactions between multiple electrostatic probes that are separated by distances that are shorter than or comparable to the characteristic plasma shielding length, for example, double floating probe systems on spacecraft at high altitudes where Debye lengths exceed the probe-spacecraft separation. The computation involves crude approximations accounting for space charge effects, currents due to the emission and exchange of photoelectrons, and currents from the ambient plasma. (Modified author abstract) GRA

N74-28187# Naval Intelligence Support Center, Washington, D.C. Translation Div.
INVESTIGATING A QUASI-UNDIMENSIONAL MODEL OF A GAS DISCHARGE CONTRACTION
A. F. Vitshas, A. M. Dykhne, V. G. Naumov, and V. P. Panchenko 14 Dec. 1973 10 p refs Transl. into ENGLISH from Teplofiz. Vys. Temp. (Moscow), v. 9, no. 2, Mar./Apr. 1971 p 225-229
(AD-777442; NISC-Trans-3487) Avail: NTIS CSCL 20/9

Theoretical investigations are made of a heat contraction model of low-temperature plasma for the case of plane geometry discharge. GRA

N74-28188# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
MICROWAVE BREAKDOWN CALCULATIONS THAT INCLUDE THE EFFECTS OF PREIONIZATION IN NEON AND NEON-ARGON MIXTURES Physical Sciences Research Papers
Mark R. Foster 6 Sep. 1973 26 p refs
(AF Proj. 4642)
(AD-778081; AFCRL-TR-73-0562; AFCRL-PSRP-563) Avail: NTIS CSCL 20/9

A computer program has been written to calculate the electric field required to initiate microwave breakdown in a partially ionized gas. The breakdown field is found by calculating ionization rates and diffusion loss rates and then solving for the value of the electric field at which these rates balance. In the preionization case, a modified diffusion coefficient is required to account for charge-separation effects. The program reported here uses the method of MacDonald for calculating ionization and diffusion loss rates and extends that method to the preionization case by using a multiplicative factor to model the transition to ambipolar diffusion. Results are graphed for neon and neon-argon mixtures using various values of the characteristic diffusion length and signal frequency over a range of gas pressures. Author (GRA)

N74-28189# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
ELECTROACOUSTIC PROBE RESULTS OBTAINED IN AN ARGON AFTERGLOW PLASMA FOR A PLANAR GEOMETRY Physical Sciences Research Papers
Nicholas V. Karas 2 Nov. 1973 70 p refs
(AF Proj. 4642)
(AD-778076; AFCRL-TR-73-0665; AFCRL-PSRP-573) Avail: NTIS CSCL 20/9

Experimental data resulting from an investigation of the electroacoustic probe in an argon afterglow plasma for a planar geometry indicate the value of the probe as a diagnostic tool. It is suited to airborne payloads because of its small size and rugged construction. In carrying out the study, some of the parameters that were varied were the pressure, input power to the probe and frequency of input signal. Electroacoustic probe predictions of the electron density gradients close to a surface were found to compare closely with the electron density gradients obtained with a floating double Langmuir probe. Treating the electroacoustic probe as similar to a resonant circuit produced some preliminary results that show up as familiar Q values. Both linear and nonlinear responses of the electroacoustic probe are illustrated. Author (GRA)

N74-28190# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
EFFECTS OF DIFFERENT FLOW FIELD CONDITIONS ON THE HIGH POWER TRANSMISSION PROPERTIES OF A REENTRY PLASMA Physical Sciences Research Papers
Robert J. Papa and Richard L. Taylor 14 Dec. 1973 55 p refs
(AF Proj. 5635)
(AD-778071; AFCRL-TR-73-0754; AFCRL-PSRP-580) Avail: NTIS CSCL 20/9

The computer program for calculating the high power microwave transmission coefficients of a chemically seeded reentry plasma has been described in two previous reports by the author. It has been explained how the computer code can optimize the amount of high power that can be transmitted from a reentry vehicle. The injection of electrophilic compounds into the reentry flow field can suppress the onset of antenna voltage breakdown, so that the transmitted power can be greatly increased. Using a half implicit-half explicit time integration scheme, the electron and ion transport equations coupled with Maxwell's equations are numerically integrated to determine the nonlinear reflection and transmission coefficients of a reentry plasma. Corresponding to the flow field conditions of a blunt nosed reentry vehicle (Trailblazer 2), graphs are presented to the electron density profile and plane wave reflection and transmission coefficients. (Modified author abstract) GRA

26 PHYSICS, SOLID-STATE

Includes semiconductor theory; and superconductivity. For applications see: 16 Masers. For related information see also: 10 Electronics.

N74-28191 Turku Univ. (Finland). Dept. of Physics.
ON THE DECAY OF Se-75
Vaeinoe Sutela Helsinki Suomalainen Tiedeakat. 12 Nov. 1973 23 p refs
(ISBN-951-41-0158-8) Copyright.

The gamma spectra of Se-75 were studied, employing a semiconductor and a scintillation detector. Coincidence spectra were measured with a Ge(Li) - Na(Tl) combination. The energies and intensities of 12 lines were measured: 66.20 keV (0.97), 96.77 keV (4.7), 121.18 keV (25.4), 135.98 keV (90.3), 198.55 keV (2.5), 264.52 keV (100), 279.44 keV (42.5), 304.00 keV (2.20), 401.27 keV (19.0), 419.15 keV (0.014), 573.00 keV (0.054), and 617.84 keV (0.0075). Gamma-gamma angular correlations were measured with a Ge(Li) - Na(Tl) combination. Correlation functions were calculated for four cascades: 121-280 keV, 136-265 keV, 136-66 keV, and 66-199 keV. From the angular correlation functions the spin of the levels, the multipole values, and the mixing parameters of the transitions of As-75 were determined. The following values for the mixing

parameters were obtained: delta (280 keV) = - 0.453, delta (265 keV) = - 0.173, and delta (66 keV) = 0.19. Author

N74-28192# Stanford Linear Accelerator Center, Calif.
FIELD EMISSION, THE NOTTINGHAM EFFECT, AND ENHANCEMENT OF A MAGNETIC FIELD IN LEAD OR NIOBIUM SUPERCONDUCTING CAVITIES. CHAPTER 2: HEATING OF SUPERCONDUCTING ASPERITIES BY THE NOTTINGHAM EFFECT IN INTENSE HIGH FREQUENCY FIELDS Ph.D. Thesis
H. Bergeret [1974] 43 p refs Transl. into ENGLISH of the thesis from the Univ. of Paris, Orsay
(SLAC-Trans-161) Avail: NTIS HC $4.25

Field emission has been studied by either X-ray observation or by the frequency shift it produces. Until the present, a single mechanism has been evoked to explain losses in the presence of emission, that is, the transfer of part of the high frequency energy to kinetic energy in the electrons injected into the cavity at the tips of the asperities. On this subject, there exist only a few brief numerical evaluations. Here, a very different type of loss is proposed, tied to energy exchanges between the electrons of the superconductor and the emitted electrons, that is to say, by the Nottingham effect. At the outset the current emitted from an ellipsoidal microprojection is calculated (asperity, or whisker) in a system suitable for justifying this estimate at high frequencies; then the Nottingham effect is introduced. Finally, it is demonstrated that the heating brought about by the energy loss of the Nottingham effect operates in certain cases to transform the superconducting asperities to the normal state.
Author (NSA)

N74-28193 Georgia Inst. of Tech., Atlanta.
THE OPTICAL PROPERTIES OF THE Cd3As2-Cd3P2 ALLOY SYSTEM Ph.D. Thesis
Maury Zivitz 1974 216 p
Avail: Univ. Microfilms Order No. 74-11423

The near-normal-incidence, room-temperature reflectance spectra of the Cd3As2-Cd3P2 semiconductor alloy system were measured over the photon-energy range 0.14 to 21.2 eV. Use of synchrotron radiation from an Electron storage ring allowed the extension of this high energy limit to 30 eV in the case of Cd3As2. A comparison was made of the primary reflectance data with the results of others, as well as with the available band-structure calculations. This procedure was adapted since there exist no values of the optical constants above the infrared region. The optical constants were generated from 0.14 to 21.2 eV by a Kramers-Kronig analysis of the primary data. As a result of the generation of the optical constants, it was possible to interpret more fully the contributions to the fundamental-absorption edges. Dissert. Abstr.

N74-28194 Case Western Reserve Univ., Cleveland, Ohio.
FAR INFRARED ISOLATOR Ph.D. Thesis
Warren Timothy Boord 1973 153 p
Avail: Univ. Microfilms Order No. 74-10774

It was determined that optical isolators for linearly polarized laser beams of moderate power may be constructed with n-type InSb as the active element. The Faraday effect was utilized in the device. Total Faraday rotation at 10.6 microns is the sum of several contributing effects, the largest of which is the free electron Faraday effect. Interband transitions and electronic transition between the bound energy levels of complex crystal imperfections also contribute to the total Faraday rotation at 10.6 microns. The absorption coefficient of InSb varies with supplier and with the type of donor, being larger for S doped InSb than for Te doped InSb. In a typical device, the InSb wafer is 0.38 mm thick, is maintained at liquid nitrogen temperature, has a net uncompenstated donor (Te) concentration of about 1 x 10 to the 17th power cc and provides a 45 deg rotation in a field of 4.6 kilogauss. The power dissipated in the InSb wafer is approximately 26% of the power incident on the wafer. There is no thermal runaway, focusing, or defocusing for incident power densities up to 75 watts/sq cm. Dissert. Abstr.

N74-28195 Arizona State Univ., Tempe.
THE STUDY OF HYSTERESIS IN SOLID STATE TRANSITIONS OF THE RARE EARTH OXIDES Ph.D. Thesis
Arthur Troy Lowe 1974 153 p
Avail: Univ. Microfilms Order No. 74-10714

A thermogravimetric study of hystersis in the TbOx-02 system was investigated and has provided insight into the phase transitions of the rare earth oxides. A series of isobaric scanning loops at 380 torr was made. Other scanning paths were made which rarely followed patterns previous theories would have predicted for hysteresis in solid state transitions. Some thermodynamic aspects and the microdomain concept as applied to hysteresis are considered. The effects of crystal size on hysteresis in phase reactions of praseodymium and terbium oxides were also studied by means of thermogravimetric analysis. By calculating the change in microdomain size with change in the composition of the oxide, an estimate of the surface free energy and the range of microdomain sizes was determined.
Dissert. Abstr.

N74-28196 Stanford Univ., Calif.
GALLIUM NITRIDE LIGHT EMITTING DIODES Ph.D. Thesis
Herbert Paul Maruska 1974 220 p
Avail: Univ. Microfilms Order No. 74-13659

The synthesis and characterization of hetero-epitaxial gallium nitride films were reported with particular reference to the phenomenon of light emission. Gallium nitride was grown by the chemical vapor deposition technique using sapphire substrates. Techniques for characterization included optical, scanning electron, and transmission electron microscopy and measurements of various electrical and optical properties of the films. The thin films of gallium nitride were doped during growth with zinc and magnesium to form n-i junctions. Such material provided the basis for the fabrication of m-i-n light-emitting diodes, which emitted light in the high-energy violet region of the visible spectrum with magnesium doping and green light with zinc doping.
Dissert. Abstr.

N74-28197 Cincinnati Univ., Ohio.
ANALYTICAL AND EXPERIMENTAL CONTRIBUTIONS TO THE CHARACTERIZATION OF DEEP IMPURITIES IN IV-IV SEMICONDUCTORS Ph.D. Thesis
Joseph H. Nevin 1974 182 p
Avail: Univ. Microfilms Order No. 74-12453

The use of thallium as a dopant in silicon has been quite limited, principally because of the considerable difficulty involved in introducing thallium into silicon. It was part of the objective of the current work to improve the control of thallium as a dopant and to refine the determination of the energy level. A new process was invented for the introduction of thallium into silicon. This process was essentially a paint-on technique, but with several novel and critical steps added. Thallium was evaporated onto the silicon surface using normal vacuum evaporation methods. In order to prevent thallium evaporation during diffusion, a coating of pyrolytic silicon dioxide was applied to lock-in the thallium. The thickness and annealing steps of the oxide were critical in order to have a coating with sufficient integrity to contain the rendency of the thallium to escape by evaporation. With a 2 to 3 micrometer thick pyrolytic silicon dioxide coating over the thallium, it was possible to diffuse thallium into silicon in an open tube operation at about 1300 C.
Dissert. Abstr.

N74-28198 Corneil Univ., Ithaca, N.Y.
SUPERFLUIDITY OF THIN He SUP 4 FILMS Ph.D. Thesis
Moses Hung-Wai Chan 1974 135 p
Avail: Univ. Microfilms Order No. 74-13748

Superfluid persistent currents in thin He4 films was investigated at temperatures down to 0.2K using a gyroscopic technique. It was found that on a bare Vycor glass substrate no superflow is possible for He4 films less than two atomic layers. It was also found that at a sufficiently low temperature all He4 atoms above this critical coverage participate in the superflow. The critical coverage necessary to support superflow is reduced when the porous glass is preplated with one layer of neon. For superfluid films on both substrates, the temperature at which dissipation sets in was found to increase linearly with the He4 film thickness. The dissipation process is studied by measuring the critical velocity of the superflow as a function of temperature as well as film thickness. It is shown that the dissipation process can be attributed to the creation of vortex line pairs. Dissert. Abstr.

N74-28199 Yale Univ., New Haven, Conn.
SUPERCONDUCTOR FLUCTUATIONS ABOVE TRANSITION IN A MAGNETIC FIELD Ph.D. Thesis
Subodh Raghunath Shenoy 1973 158 p
Avail: Univ. Microfilms Order No. 74-12491

The effect is considered of a magnetic field on order parameter fluctuations in superconductors above their second-order transition temperatures. The fluctuation-induced specific heat for a bulk Type II superconductor is calculated in a nonzero field H, just above the transition temperature, but outside the critical region. In the Ginzburg-Landau (GL) approximation, it is found that close to transition the specific heat is enhanced, with the temperature dependence changing from bulk behavior to a one-dimensional form. This change in effective dimensionality is accompanied by an expansion of the critical region. The clean bulk case, the results of Lee and Payne, and of Kurkijarvi, Ambegaokar and Eilenberger for the thermodynamic potential that includes the higher order field terms neglected by the GL approximation. A proposal is examined of Scalapino that the order parameter correlation function can be probed by a magnetic field. Dissert. Abstr.

N74-28200 Pennsylvania Univ., Philadelphia.
PHOTOCONDUCTIVE AND OPTICAL PROPERTIES OF ORGANIC MOLECULAR CRYSTALS Ph.D. Thesis
Arthur Araron Bright 1973 149 p
Avail: Univ. Microfilms Order No. 74-14033

Studies of the electronic properties of organic molecular crystals have been made using photoconductivity and optical techniques. Photoconductivity has been observed in high purity TCNQ single crystals and polycrystalline evaporated thin films. The photo current was measured as a function of wavelength, light intensity, voltage, and temperature. A photoconducting edge is observed at about 1.7eV. The spectral response of the crystals and films are essentially identical. Comparison with optical absorption, reflection, and resistivity data imply that the 1.7eV edge is a measurement of the band gap. The relatively small value is attributed to the high electron affinity of TCNQ and its polaron binding energy. Pulsed photocurrent measurements give a drift mobility for both electrons and holes of about 0.4 sq cm/volt sec in single crystals and somewhat lower in thin films. Dissert. Abstr.

N74-28201 Wisconsin Univ., Milwaukee.
ELECTRONIC PROPERTIES OF AMORPHOUS SILICON Ph.D. Thesis
Yu Kong Chan 1973 139 p
Avail: Univ. Microfilms Order No. 74-8973

Amorphous semiconductors are interesting from both application and theoretical point of view. Knowledge of the mobility gap, localized states and their energy distribution, conduction mechanism is of fundamental importance in understanding many interesting characteristics of amorphous semiconductors. Various experimental techniques were applied to investigate the electronic properties of amorphous silicon and theoretical models were developed to interpret the experimental results. For amorphous silicon, it is found that (1) the mobility gap of amorphous silicon is about 1.7ev. (2) the density of localized states in the mobility gap varies between 10 to the 17th power/ev/cu cm to 10 to the 18th power/ev/cu cm, as is derived from the studies on amorphous silicon-electrolyte system, MOS system and conductivity measurements. (3) conduction mechanism depends very heavily on the preparation conditions and thermal history. In unannealed films it is predominantly Poole-Frenkel conduction and it change to space-charge controlled upon annealing. (4) annealing has a marked effect on properties of amorphous silicon films. It influences strongly the conduction mechanism, conductivity, carrier diffusion, distribution of localized states. Dissert. Abstr.

N74-28202 Minnesota Univ., Minneapolis.
THEORY OF PHASE SEPARATION IN QUANTUM CRYSTAL ALLOYS Ph.D. Thesis
Wei-Tze Huang 1973 65 p
Avail. Univ. Microfilms Order No. 74-10518

The development of a theory for explaining the separation of solid mixtures of isotopic helium at temperatures below 0.5 K is discussed. The proper states of the solid mixture are described by linear combinations The proper states of the solid mixture are described by linear combinations of localized states. The free energy and other thermodynamic properties are obtained by calculating the energy and entropy of the solid mixture using the localized states. Two mutually equivalent methods to calculate the energy and entropy are proposed. Dissert. Abstr.

N74-28203*# Tyco Labs., Inc., Waltham, Mass.
SINGLE CRYSTAL MEMBRANES
R. W. Stormont and A. Morrison Apr. 1974 60 p refs
(Contract NAS3-17346)
(NASA-CR-134651; C-362) Avail: NTIS HC $6.00 CSCL 20B

Single crystal a- and c-axis tubes and ribbons of sodium beta-alumina and sodium magnesium beta-alumina were grown from sodium oxide rich melts. Additional experiments grew ribbon crystals containing sodium magnesium beta, beta double prime, beta triple prime, and beta quadruple prime. A high pressure crystal growth chamber, sodium oxide rich melts, and iridium for all surfaces in contact with the melt were combined with the edge-defined, film-fed growth technique to grow the single crystal beta-alumina tubes and ribbons. The crystals were characterized using metallographic and X-ray diffraction techniques, and wet chemical analysis was used to determine the sodium, magnesium, and aluminum content of the grown crystals. Author

N74-28204*# Kanner (Leo) Associates, Redwood City, Calif.
DEVELOPMENT OF METHODS FOR SYSTEMATIC CONTROL OF CARRIER LIFETIME IN SILICON SLICES
J. L. Lambert, K. H. Sommer, E. Borchert, and J. Koch Washington NASA Jun. 1974 160 p refs Transl. into ENGLISH from "Entwicklung von Verfahren zur gezielten Einstellung der Traegerlebensdauer in Siliziumscheiben" Frankfurt, West Ger., AEG-Telefunken, BMFT-FB-T-73-05, Apr. 1973 194 p
(Contract NASw-2481)
(NASA-TT-F-15656; BMFT-FB-T-73-05) Avail: NTIS HC $11.00 CSCL 20L

Control of the carrier lifetime in n-type base regions of gallium diffused powder thyristor and diode structures is considered. The scattering of the lifetime values after lowering the lifetime by gold diffusion is due to different vacancy generation rates in different silicon crystals. A practical example of gold diffusion technology is discussed. The phosphorus gettering mechanism is studied. High lifetimes can also be obtained by liquid phase diffusion from gallium. Hall effect measurements indicate the concentrations of deep impurities before and after the high temperature processes. A new method of lifetime measurement developed for process control is described. Author

N74-28205# Brookhaven National Lab., Upton, N.Y. Dept. of Applied Science.
SURVEY OF LARGE-SCALE APPLICATIONS OF SUPERCONDUCTIVITY Informal Report
J. R. Powell 1973 167 p refs Presented at Conf. on Advan. Study Inst. on Large Scale Appl. of Superconductivity and Magnetism, Entreves, Italy, 5 - 14 Sep. 1973 Sponsored by AEC
(BNL-18376; Conf-730970) Avail: NTIS HC $10.50

A survey is made of potential future large-scale uses of superconductivity, including fusion, MHD, magnetic energy storage, power transmission, high-speed ground transport, and magnetic separation. The superconducting technological requirements for each application are examined with regard to present and projected capabilities. The requirements of the nonsuperconducting system components in each application are also examined, together with an investigation of how advances in superconducting technology can ease demands on the nonsuperconducting components. Economic and social factors relating to each application are also discussed. An assessment of the likelihood of success for each application is made. (89 references)
Author (NSA)

N74-28206# California Univ., Berkeley. Lawrence Berkeley Lab.
LBL SUBERCONDUCTING ACCELERATOR DEVELOPMENTS
W. S. Gilbert Nov. 1973 19 p refs Presented at Seminar on High-Energy Accelerator Sci., Tokyo, 5 Nov. 1973

(Contract W-7405-eng-48)
(LBL-2418; Conf-731115-5) Avail: NTIS HC $3.00

Research progress on the LBL Superconducting Experimental Accelerator for accelerating protons from 50 MeV to 5 GeV at a maximum dipole field of about 50 kG is described. Work on pulse dipoles and transport magnets is outlined, and superconductor development and testing is reviewed. NSA

N74-28207# Minnesota Univ., Minneapolis.
THEORY OF PHASE SEPARATION IN QUANTUM CRYSTAL ALLOYS
W. Huang Dec. 1973 65 p refs Sponsored by AEC
(COO-1569-110) Avail: NTIS HC $5.25

Solid mixtures of isotopic helium separate into a He-3 rich phase and a He-4 rich phase at temperatures below 0.5K and near melting pressure. A semiclassical theory for this phenomenon was proposed by W. Mullin in which the volume effect was taken into account. A theory based on first principles of the quantum mechanics is proposed and this theory contains Mullin's theory as a special case. The theory starts with a set of localized states, in one of such states each atom is localized around a lattice site. The proper states of the solid mixture are described by linear combinations of these localized states. The free energy and henceforth other thermodynamic properties are obtained by calculating the energy and the entrophy of the solid mixture, utilizing the localized state. Two mutually equivalent methods are proposed to calculate the energy and entrophy. In the first method use is made of a combinatorial analysis which inspired the invention of the second method in which the free energy is calculated within a restricted ensemble. Author (NSA)

N74-28208# Cornell Univ., Ithaca, N.Y. Dept. of Materials Science and Engineering.
STUDY OF THE INTERACTION BETWEEN MAGNETIC FLUXOIDS AND CRYSTAL DEFECTS IN TYPE 2 SUPERCONDUCTORS
E. J. Kramer 31 Oct. 1973 31 p refs
(Contract AT(11-1)-3169)
(COO-3169-17) Avail: NTIS HC $3.75

Irradiation by fast neutrons at 4.2 K was shown to decrease the pinning effectiveness of cell walls in Nb whereas both 4.2 K and room temperature neutron irradiation increase the pinning force density (Fp) at low reduced field h in annealed Nb-10 Mo but the Fpvs h curve which develops is much broader than that in Nb at a comparable dose. These differences can be attributed to the much higher density of black spot damage observed in Nb-10 Mo with electron miscroscopy. All irradiated samples obey the microstructural pinning rules predicted by the model of flux pinning for hard superconductors. These pinning rules were also tested and found satisfactory for materials where the dominant pinning centers are grain boundaries, precipitates, particles, and dislocation cell walls. The magnitude and h dependence of Fp at high fields is correctly predicted by the model for a wide variety of materials. Author (NSA)

N74-28209# Washington Univ., Seattle. Coll. of Engineering.
STUDY OF PHASE TRANSFORMATIONS AND SUPERCONDUCTIVITY Annual Progress Report
V. Chandrasekaran, W. Cotton, S. Narasimhan, R. Taggart, and D. H. Polonis 15 Oct. 1973 73 p refs
(Contract AT(45-1)-2225)
(RLO-2225-T-13-19) Avail: NTIS HC $5.75

The electrical resistivity of beta stabilized titanium alloys was examined to determine the influence of the constitution and microstructure on the temperature coefficient of resistivity. A kinetic study was undertaken to determine the effect of vacancies, composition fluctuations, and plastic deformation on the progress of the omega precipitation reaction. The superconductivity studies concentrated on the effects of microstructure on the magnetization behavior of alloys and the influence of alloy chemistry on the transition temperature of ternary alloys based on titanium. The origin of the flux instabilities in beta stabilized alloys containing dispersed omega and alpha particles was identified with the eddy currents induced in these particles during field increments. The experimental work has shown that deformation prior to aging is a significant factor controlling the kinetics of precipitation in Zr-Nb alloys as well as the size and distribution of the precipitate omega particles available for flux pinning. NSA

N74-28210# California Univ., Berkeley. Lawrence Berkeley Lab.
ELECTRONIC STRUCTURE OF NARROW-GAP SEMICONDUCTORS
M. L. Cohen Sep. 1973 36 p refs Presented at Intern. Conf. on the Phys. of Semimetals and Narrow-Gap Semiconductors, Nice, 10 Sep. 1973
(Contract W-7405-eng-48; Grant NSF GH-35688)
(LBL-2269; Conf-730975-1) Avail: NTIS HC $4.00

Recent theoretical progress related to the one-electron theory of the electronic structure of several IV-VI and II-VI compounds and alloys are discussed. Some of the superconducting properties are also analyzed. Author (NSA)

N74-28211# Florida Univ., Gainesville.
DEVELOPMENT AND APPLICATIONS OF THIN FILM DETECTORS Progress Report, 1 Jan. - 31 Dec. 1973
M. L. Muga [1974] 107 p refs
(Contract AT(40-1)-2843)
(ORO-2843-23) Avail: NTIS HC $7.50

Topics discussed include: improved model of thin film luminescance response to transiting heavy ions; response of thin film scientillator detector to high energy argon and krypton ions; luminescence response of thin plastic scintillator detectors to fission fragments from proton induced fission of Th-232, U-235, and U-238; fragment nuclear charge structure in the thermal-neutron-induced fission of U-235, specific luminescence studies in plastic scintillators; and applications of thin film scintillator detectors to fission investigations. NSA

N74-28212# Illinois Univ., Urbana.
POINT DEFECTS IN SEMICONDUCTORS
J. S. Koehler 1973 10 p refs Presented at the Conf. on Point Defects, Tbilisi, USSR, 15 Oct. 1973
(Contract AT(11-1)-1198)
(COO-1198-1025; Conf-731054-1) Avail: NTIS HC $3.00

Point defects in types III-V and II-VI compounds were analyzed and it was concluded that it does not seem likely that an adequate theory of defects in semiconductors will be achieved in the near future, although this could happen if some simple approximate scheme of calculation could be shown to give results in agreement with present experimental findings. New observations are needed which can identify the particular defect involved. It would be helpful to identify certain infrared absorption bands with vacancies in definite charge states. Thus far nothing has been said about defects in III-V or in II-VI compounds. Since a vacancy in a type III site differs from a vacancy in a type V site, it is evident that the situation is more complicated in such compounds than in the valence IV semiconductors. Author (NSA)

N74-28213# Westinghouse Research Labs., Pittsburgh, Pa.
NOVEL MAGNETIC MATERIALS FOR SIGNAL PROCESSING Final Report
W. J. Carr, Jr., A. I. Braginski, M. R. Daniel, P. R. Emtage, T. W. OKeeffe, and R. W. Patterson 18 Feb. 1974 20 p refs
(Contract F44620-72-C-0035; AF Proj. 9764)
(AD-777197; AFOSR-74-0461TR; Rept-74-9F3-BUSON-R1) Avail: NTIS CSCL 20/12

Interactions of magnetic domain walls with surface acoustic waves and with sheet currents in adjacent magnetoresistive layers have been investigated. Theoretical analysis was performed to study these interactions, and general theory was developed for the forces which can act at each point on a static or moving domain wall. Experimental attempts to detect the acoustic interaction were not successful. Experiments on the magnetoresistive interaction are more promising but not yet conclusive. In the course of the study bistable bubble domains were discovered and characterized. Author (GRA)

N74-28214# Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOLID STATE RESEARCH, 1973:4 Quarterly Technical Summary, 1 Aug. - 31 Oct. 1973
Alan L. McWhorter 15 Nov. 1973 92 p refs
(Contract F19628-73-C-0002; AF Proj. 649L)
(AD-778086; ESD-TR-73-263) Avail: NTIS CSCL 20/12

The report covers in detail the solid state research work of the Solid State Division at Lincoln Laboratory for the period 1 August through 31 October 1973. The topics covered are

Solid State Device Research, Quantum Electronics, Materials Research, Physics of Solids, and Microelectronics. The Microsound work is sponsored by ABMDA and is reported under that program. Author (GRA)

N74-28215# Rensselaer Polytechnic Inst., Troy, N.Y.
TRANSITION METAL IONS AND HETEROGENEOUS NUCLEATION IN GLASS Annual Report
John Aitken, Deug Moon, Robert T. MacCrone, and Gary Cieloszyk Jan. 1974 82 p refs
(Contract N00014-67-A-0117-0017; NR Proj. 032-538)
(AD-776322; RPI-JBD35-1) Avail: NTIS

Magnetization measurements on x Fe2O3 (1-x) / BaO 4B2O3/ glasses have been made over the temperature range from 50 mK to 300K. Electron paramagnetic resonance measurements were also made on the same specimens at the temperatures 300 and 77K. These structure sensitive measurements reveal that the majority of the iron ions exist in paris (diads) and groups of three (triads). The isolated Fe(+3) concentration was obtained from the epr g = 4.28. The existence of the triads was inferred from their magnetic susceptibility. This susceptibility was obtained by subtracting the theoretical magnetization of the isolated ions from the total measured value. On the assumption that the triads order at liquid helium temperatures with a resultant moment equal to one of the members, the concentration of isolated Fe(=3) ions as a function of total Fe2O3 content was independently determined, and found to be in quantitative agreement with the epr measurements. Author

N74-28216# Westinghouse Research Labs., Pittsburgh, Pa.
FLUX QUANTIZATION AND THE JOSEPHSON EFFECT IN EXTREME TYPE 2 SUPERCONDUCTORS Annual Summary Report, 1 Apr. - 31 Dec. 1973
M. A. Janocko and C. K. Jones 1 May 1974 10 p refs
(Contract N00014-73-C-0315)
(AD-778041; Rept-74-9J2-SUCON-R1) Avail: NTIS CSCL 20/12

Most of the work performed was concerned with fabrication of junction of very high T(c) materials. Several Nb3Ge junctions were examined, with inconclusive results. Further work on Mo-Re junctions has increased the temperature range of operation. Single junction magnetometer loops were fabricated for testing at NRL. (Modified author abstract) GRA

N74-28217# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DETERMINATION OF REFRACTIVE INDEX OF THIN FILMS FROM INTERFERENCE-FRINGE REFLECTION SPECTRA M.S. Thesis
Jan B. Jaeger Jan. 1974 94 p refs
(AD-777843; GEP/PH/74-9) Avail: NTIS CSCL 20/5

Reflection spectra were recorded on selected thin film materials from 2.5 micrometers to 17.0 micrometers using light polarized parallel to the plane of incidence. The materials were CdS, CdSe, CdTe, Ge, ZnS, ZnSe, and ZnTe vacuum evaporated onto KCl substrates. The spectra were analyzed using two different techniques: (1) The Fresnel reflection coefficients were applied to a three media model, where the second medium had an extinction coefficient, and (2) an index of refraction was computed from the interference fringes of the spectra. The interference-fringe analysis indicates that the index of refraction of the thin film coatings is approximately the same as that of the bulk material in the 10.0 micrometer region, except for CdS. Author (GRA)

N74-28218# Manlabs, Inc., Cambridge, Mass.
PHYSICAL CHARACTERIZATION OF ELECTRONIC MATERIALS Interim Report
S. Andrew Kulin, Konstantin Kreder, and Peter Neshe 1 Jul. 1973 73 p refs
(Contract F19628-73-C-0051; AF Proj. 5620)
(AD-778091; SR-1; AFCRL-TR-73-0652) Avail: NTIS CSCL 20/6

Compressive deformation techniques were studied for the fabrication of fine grained polycrystalline KCl from high purity single crystal starting material. The processing parameters included temperature, total strain, strain rate, heating and cooling rates and stress. The experimental conditions were optimized to produce crack-free fine grained KCl windows of six inch diameter and above. Grain size and crystallographic texture were measured in as-fabricated windows. Proportional limit, modulus of rupture, and impact strength values were also obtained on the polycrystalline material. No detectable differencies were obtained in optical absorption at 10.6 micrometers on the polycrystalline windows as compared with the unprocessed KCl single crystal material. Author (GRA)

N74-28219# Perkin-Elmer Corp., Norwalk, Conn. Optical Group.
MOLECULAR BEAM EPITAXY OF II-VI COMPOUND WAVEGUIDES Technical Report, 1 Jul. 1973 - 28 Feb. 1974
Donald L. Smith 25 Mar. 1974 53 p refs
(Contract N00014-73-C-0280; ARPA Order 2327)
(AD-778354; PE-ER-11878) Avail: NTIS CSCL 20/2

Thin films of ZnSe, ZnTe, Zn(SeTe), Cd(SeTe) and CdTe were grown on CdS, CdSe, CaF2, and sapphire substrates by evaporation of the elements under ultra-high vacuum. Substrate chemical polishing techniques were developed. Elemental and compound evaporation and deposition rates were measured by mass spectrometer, film thickness, and quartz crystal microbalance. Compounds grew at temperatures far above those at which elements alone would condense, but well below the compound decomposition temperatures. Films were analyzed by LEED and Auger spectroscopy. Monocrystalline films were obtained over narrow substrate temperature ranges, below which films were polycrystalline and above which deposition ceased. (Modified author abstract) GRA

N74-28220# Princeton Univ., N.J. Solid State and Materials Lab.
VACUUM UV ABSORPTION SPECTRA INDUCED BY Al(+) ION IMPLANTATION IN SiO2 FILMS ON SAPHIRE
T. J. Russell, T. Pandolif, and B. S. H. Royce 22 Apr. 1974 17 p refs
(Contract N00014-67-A-0157-0026)
(AD-777967; PSSL-220474) Avail: NTIS CSCL 20/12

Measurements are reported on the vacuum ultraviolet absorption spectra induced in SiO2 films by Al(+) ion implantation. Studies have been made of the thermal stability of the associated defects and their response to X-irradiation subsequent to partial annealing. The implantation has been found to introduce an absorption band at 6.2 eV in films derived from the thermal decomposition of silane and at 7.5 eV in a fully oxidized S.O.S. film. In addition to introducing these vacuum ultraviolet absorption bands the implantation moves the fundamental absorption edge to lower energies. This band edge shift anneals in parallel to the disappearance of the absorption bands and X-irradiation after a partial annealing is found to cause it to move towards lower energies again. This behavior is discussed in terms of the oxide structure. Author (GRA)

27 PROPELLANTS

Includes fuels; igniters; and oxidizers. For basic research see: 06 Chemistry; and 33 Thermodynamics and Combustion. For related information see also: 28 Propulsion Systems.

N74-28221# Royal Aircraft Establishment, Farnborough (England).
OPTIMIZATION OF SUPERSONIC FUELS FROM LOW POLYMERS OF C SUB 3 AND C SUB 4 OLEFINS BY MEANS OF n-PARAFFINS
R. Erlmeir Jan. 1974 28 p refs Transl. into ENGLISH from the German report DLR-FB-73-32
(RAE-Lib-Trans-1737; BR39243; DLR-FB-73-32) Avail: NTIS HC $4.50

Fuels from completely hydrogenated low molecular C3/C4 olefin polymers are suitable as supersonic fuels due to their high stability, but in general, their low temperature viscosities and vapour pressures exceed limitations. Subject work outlines the optimization of C3/C4 polymer fuels by straight-chain hydrocarbons containing 10 to 16 carbon atoms. For this purpose, the influence of n-paraffins on the freezing point, low tempera-

ture viscosity, vapour pressure, energy content and combustion characteristics of four polymer fuels were investigated. Low temperature viscosity, vapour pressure and luminometer number can be optimized at the expense of the freezing point to such an extent, that they meet current maximum requirements for Mach 3 conditions. Author

N74-28222*# Rockwell International Corp., Downey, Calif. Space Div.
SEMIANNUAL FORECAST FOR GOVERNMENT FURNISHED MATERIALS PRESSURANTS/PROPELLANTS FOR SPACE SHUTTLE ORBITER PROGRAM
26 Apr. 1974 46 p
(Contract NAS9-14000)
(NASA-CR-134316; SD74-SH-0125; IRD-LS-123T) Avail: NTIS HC $5.50 CSCL 21I

A semi-annual forecast of Government Furnished Pressurants and Propellant, and GFM required to support the development, fabrication, production, and test of the space shuttle orbiter. Author

N74-28223*# Singer Co., Little Falls, N.J. Kearfort Div.
DEVELOPMENT AND DEMONSTRATION OF FLUERIC SOUNDING ROCKET MOTOR IGNITION Final Report
Vicent P. Marchese Washington NASA Jun. 1974 44 p refs
(Contract NAS1-10680)
(NASA-CR-2418; KD73-40) Avail: NTIS HC $3.25 CSCL 21B

An analytical and experimental program is described which established a flueric rocket motor ignition system concept incorporating a pneumatic match with a simple hand pump as the only energy source. An evaluation was made of this concept to determine the margins of the operating range and capabilities of every component of the system. This evaluation included a determination of power supply requirements, ignitor geometry and alinement, ignitor/propellant interfacing and materials and the effects of ambient temperatures and pressure. It was demonstrated that an operator using a simple hand pump for 30 seconds could ignite BKNO3 at a standoff distance of 100 m (330 ft) with the only connection to the ignitor being a piece of plastic pneumatic tubing. Author

N74-28224# Hermann Oberth-Gesellschaft, Gesellschaft zur Foerderung der Erforschung und Erschliessung des Weltraums e. V., Hannover (West Germany)
CHARACTERISTICS OF SOLID PROPELLANTS [UEBER KENNZEICHEN VON FESTTRIEBSTOFFEN]
Eberhard Buechner (Tech. Univ. Munich) and Manfred Mayer 1972 8 p refs In GERMAN
(Astronaut-FB-30) Avail: NTIS HC $4.00

A mathematical expression for the following characteristic properties of a solid propellant was derived: burning rate, combustion chamber pressure, mass flow coefficient, specific mass of the combustion gas, and the ratio between the total burning surface and the surface of the smallest cross section of the propelling nozzle. Additional expressions for combustion stability and for the dependance of the combustion chamber pressure on the propellant temperature were derived. ESRO

N74-28225# Harvard Radio Astronomy Station, Fort Davis, Tex.
STUDY OF THE RADIO FREQUENCY SPECTRUM OF THE SUN Final Report, 1 Mar. - 30 Sep. 1973
Alan Maxwell Jan. 1974 8 p refs
(Contract F19628-73-C-0231; AF Proj. 7649)
(AD-778090; AFCRL-TR-74-0029) Avail: NTIS CSCL 03/2

The report summarizes programs carried out under AFCRL contract F19628-73-C-0231 with Harvard University. The contract was written to cover research work on the spectral characteristics of radio bursts from the sun. The work was carried out at Fort Davis, Texas, with sweep-frequency receivers covering the band 10-4000 MHz. Author (GRA)

28 PROPULSION SYSTEMS

Includes air breathing, electric, liquid, solid, and magnetohydrodynamic propulsion. For nuclear propulsion see: 22 Nuclear Engineering. For basic research see: 23 Physics, General; and 33 Thermodynamics and Combustion. For applications see: 31 Space Vehicles. For related information see also: 27 Propellants.

N74-28226* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SUPERSONIC FAN BLADING Patent
Arthur W. Goldstein, inventor (to NASA) Issued 28 Jun. 1974 4 p Filed 21 Jan. 1972 Supersedes N72-20770 (10 - 11, p 1520)
(NASA-Case-LEW-11402-1; US-Patent-3,820,918; US-Patent-Appl-SN-219806; US-Patent-Class-416-223; US-Patent-Class-416-237; US-Patent-Class-415-181) Avail: US Patent Office CSCL 21E

Radially extending rotor blades are disposed on a hub to form a supersonic propulsion fan for a turbofan engine. The peripheral spacing of the blades is such as to avoid forming a channel or passageway between adjacent blades. Each has a flat trailing surface extending from the leading edge at least as far to the rear as to cause any pressure waves which might originate on the blade surface to strike the leading surface of the following blade rather than propagate upstream of the blade row. The flat trailing surface of each blade makes an angle with the axis of rotation such that the blade is parallel to a gas inflow into the blades. Official Gazette of the U.S. Patent Office

N74-28227*+ Bureau of Mines, Pittsburgh, Pa. Mining and Safety Research Center.
THE HARD START PHENOMENA IN HYPERGOLIC ENGINES. VOLUME 1: BIBLIOGRAPHY Interim Report
Yael Miron and H. E. Perlee 22 Mar. 1974 77 p refs 2 Vol.
(NASA Order T-39882-G)
(NASA-CR-134313; BM-IR-1646-Vol-1) Avail: NTIS HC $7.00 CSCL 21H

A bibliography of reports pertaining to the hard start phenomenon in attitude control rocket engines on Apollo spacecraft is presented. Some of the subjects discussed are; (1) combustion of hydrazine, (2) one dimensional theory of liquid fuel rocket combustion, (3) preignition phenomena in small pulsed rocket engines, (4) experimental and theoretical investigation of the fluid dynamics of rocket combustion, and (5) nonequilibrium combustion and nozzle flow in propellant performance. Author

N74-28228# Committee on Public Works (U. S. Senate).
HISTORY AND FUTURE OF SPARK IGNITION ENGINES
David E. Gushee, Joseph P. Biniek, John E. Blodgett, and Maureen W. Ayton Washington GPO Sep. 1973 123 p refs Presented to Comm. on Public Works, 93d Congr., 1st Sess., 3 Aug. 1973 Prepared by the Library of Congr., Environ. Policy Div.
(GPO-21-389) Avail: SOD HC $1.20

In response to a request from Congress a study was conducted to show the history of the spark ignition, internal combustion engine. The study is part of an examination into the air pollution problems and the contribution made by internal combustion engines. Comparisons are made with the Diesel and steam engine vehicles. Selected writings on the choice of the spark ignition engine to power automobiles are provided. Author

N74-28229*# Avco Lycoming Div., Stratford, Conn.
DEVELOPMENT OF HELICOPTER ENGINE SEALS
Peter Lynwander Nov. 1973 108 p refs Sponsored in part by Army Air Mobility R and D Lab., Cleveland
(Contract NAS3-16720)
(NASA-CR-134647; LYC-73-48) Avail: NTIS HC $8.50 CSCL 21A

An experimental evaluation of main shaft seals for helicopter gas turbine engines was conducted with shaft speeds to 213 m/s(700 ft/sec), air pressures to 148 N/sq cm (215 psia), and air temperatures to 645 K (675 F). Gas leakage test results indicate that conventional seals will not be satisfactory for high-pressure sealing because of excessive leakage. The self-acting

face seal, however, had significantly lower leakage and operated with insignificant wear during a 150-hour endurance test at sliding speeds to 145 m/s (475 ft/sec), air pressures to 124 N/sq cm (180 psia), and air temperatures to 408 K (275 F). Wear measurements indicate that noncontact operation was achieved at shaft speeds of 43,000 rpm. Evaluation of the self-acting circumferential seal was inconclusive because of seal dimensional variations. Author

N74-28230*# American Airlines, Inc., New York.
ECONOMIC EFFECTS OF PROPULSION SYSTEM TECHNOLOGY ON EXISTING AND FUTURE TRANSPORT AIRCRAFT
G. Philip Sallee Jul. 1974 345 p
(Contract NAS3-17326)
(NASA-CR-134645) Avail: NTIS HC $7.50 CSCL 21A

The results of an airline study of the economic effects of propulsion system technology on current and future transport aircraft are presented. This report represents the results of a detailed study of propulsion system operating economics. The study has four major parts: (1) a detailed analysis of current propulsion system maintenance with respect to the material and labor costs encountered versus years in service and the design characteristics of the major elements of the propulsion system of the B707, b727, and B747. (2) an analysis of the economic impact of a future representative 1979 propulsion system is presented with emphasis on depreciation of investment, fuel costs and maintenance costs developed on the basis of the analysis of the historical trends observed. (3) recommendations concerning improved methods of forecasting the maintenance cost of future propulsion systems are presented. A detailed method based on the summation of the projected labor and material repair costs for each major engine module and its installation along with a shorter form suitable for quick, less detailed analysis are presented, and (4) recommendations concerning areas where additional technology is needed to improve the economics of future commercial propulsion systems are presented along with the suggested economic benefits available from such advanced technology efforts. Author

N74-28231*# Lockheed Electronics Co., Houston, Tex. Avionics Systems Engineering Division Internal Note.
MAIN PROPULSION FUNCTIONAL PATH ANALYSIS FOR PERFORMANCE MONITORING FAULT DETECTION AND ANNUNCIATION
E. L. Keesler Apr. 1974 76 p
(Contract NAS9-12200)
(NASA-CR-134331; LEC-3193; JSC-09030) Avail: NTIS HC $7.00 CSCL 21H

A total of 48 operational flight instrumentation measurements were identified for use in performance monitoring and fault detection. The Operational Flight Instrumentation List contains all measurements identified for fault detection and annunciation. Some 16 controller data words were identified for use in fault detection and annunciation. Author

N74-28232*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ROCKET CHAMBER AND METHOD OF MAKING Patent Application
Anthony Fortini, inventor (to NASA) Issued 24 Jan. 1974 10 p
(NASA-Case-LEW-11118-2; US-Patent-Appl-SN-436316) Avail: NTIS HC $4.00 CSCL 21H

A transpiration cooled rocket chamber is made by forming a porous metal wall on a suitably shaped mandrel. The porous wall may be made of sintered powdered metal, metal fibers sintered on the mandrel or wires woven onto the mandrel and then sintered to bond the interfaces of the wires. Intersecting annular and longitudinal ribs are then electroformed on the porous wall. An interchamber wall having orifices therein is then electroformed over the annular and longitudinal ribs. Parallel longitudinal ribs are then formed on the outside surface of the interchamber wall after which an annular jacket is electroformed over the parallel ribs to form distribution passages therewith. A feed manifold communicating with the distribution passages may be fabricated and welded to the rocket chamber or the feed manifold may be electroformed in place. Author

N74-28233*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EXHAUST FLOW DEFLECTOR Patent Application
John C. Wilson (Army Air Mobility R and D Lab., Hampton, Va.) and Craig S. Shaw, inventors (to NASA) (Army Air Mobility R and D Lab., Hampton, Va.) Issued 25 Jun. 1974 10 p Sponsored by NASA
(NASA-Case-LAR-11570-1; US-Patent-Appl-SN-482967) Avail: NTIS HC $4.00 CSCL 21E

The development of an exhaust gas deflector for helicopters is discussed. The deflector straightens the swirling exhaust flow to provide better penetration of the freestream. Diagrams are provided to show the operation of the equipment. The device also eliminates heating of the airframe and discoloration of the surface due to the exhaust gases. NASA

N74-28234*# Bureau of Mines, Pittsburgh, Pa. Mining and Safety Research Center.
THE HARD START PHENOMENA IN HYPERGOLIC ENGINES. VOLUME 2: COMBUSTION CHARACTERISTICS OF PROPELLANTS AND PROPELLANT COMBINATIONS Interim Report
Yael Miron and H. E. Perlee 22 Mar. 1974 40 p refs 2 Vol.
(NASA-CR-134314; BM-IR-1646-Vol-2) Avail: NTIS HC $5.00 CSCL 21H

The combustion characteristics of hypergolic propellants are described. A research project was conducted to determine if the reaction control system engine propellants on Apollo spacecraft undergo explosive reaction when subjected to conditions present in the engine at the time of ignition. Combustion characteristics pertinent to the hard-start phenomenon are considered. The thermal stability of frozen mixtures of hydrazine-based fuels with nitrogen tetroxide was analyzed. Results of the tests are presented in the form of tables and graphs. Author

N74-28235*# Bell Aerospace Co., Buffalo, N.Y.
SPACE SHUTTLE HYPERGOLIC BIPROPELLANT RCS ENGINE DESIGN STUDY, BELL MODEL 8701 Final Report
May 1974 235 p refs
(Contract NAS9-12996)
(NASA-CR-134336; Rept-8701-910041) Avail: NTIS HC $14.75 CSCL 21H

A research program was conducted to define the level of the current technology base for reaction control system rocket engines suitable for space shuttle applications. The project consisted of engine analyses, design, fabrication, and tests. The specific objectives are: (1) extrapolating current engine design experience to design of an RCS engine with required safety, reliability, performance, and operational capability, (2) demonstration of multiple reuse capability, and (3) identification of current design and technology deficiencies and critical areas for future effort. Author

N74-28236*# North Carolina State Univ., Raleigh. Dept. of Materials Engineering.
DEVELOPMENT OF HIGH TEMPERATURE MATERIALS FOR SOLID PROPELLANT ROCKET NOZZLE APPLICATIONS Quarterly Progress Report, 1 Jul. - 30 Sep. 1973
Charles R. Manning, Jr. and Lynn D. Lineback 14 Jan. 1974 170 p refs
(Grant NGR-34-002-108)
(NASA-CR-138804; QPR-12) Avail: NTIS HC $11.50 CSCL 21H

Aspects of the development and characteristics of thermal shock resistant hafnia ceramic material for use in solid propellant rocket nozzles are presented. The investigation of thermal shock resistance factors for hafnia based composites, and the preparation and analysis of a model of elastic materials containing more than one crack are reported. For individual titles, see N74-28237 through N74-28238.

N74-28237* North Carolina State Univ., Raleigh.
FACTORS AFFECTING THE THERMAL SHOCK RESISTANCE OF SEVERAL HAFNIA BASED COMPOSITES CONTAINING GRAPHITE OR TUNGSTEN M.S. Thesis

Lynn David Lineback *In its* Develop. of High Temp. Mater. for Solid Propellant Rocket Nozzle Appl. 14 Jan. 1974 51 p refs (For availability see N74-28236 17-28)
CSCL 11D

The thermal shock resistance of hafnia based composites containing graphite powder or tungsten fibers was investigated in terms of material properties which include thermal expansion, thermal conductivity, compressive fracture stress, modulus of elasticity, and phase stability in terms of the processing parameters of hot pressing pressure and/or density, degree of stabilization of the hafnia, and composition. All other parameters were held constant or assumed constant. The thermal shock resistance was directly proportional to the compressive fracture stress to modulus of elasticity ratio and was not affected appreciably by the small thermal expansion or thermal conductivity changes. This ratio was found to vary strongly with the composition and density such that the composites containing graphite had relatively poor thermal shock resistance, while the composites containing tungsten had superior thermal shock resistance. Author

N74-28238* North Carolina State Univ., Raleigh.
MODEL FOR THERMAL STRESS RESISTANCE OF TRULY ELASTIC MATERIALS CONTAINING MORE THAN ONE CRACK Ph.D. Thesis c18
Lynn David Lineback *In its* Develop. of High Temp. Mater. for Solid Propellant Rocket Nozzle Appl. 14 Jan. 1974 104 p refs (For availability see N74-28236 17-28)
CSCL 11D

The model was developed upon the physical properties of surface energy and intrinsic modulus of elasticity of a material containing a number of equal sized microcracks which are independent of one another. The effect of these cracks upon the strain energy per unit volume of material necessary to continue simultaneous crack growth as well as the measured physical properties was established, and the thermal stress resistance is developed in terms of this energy. The model is expressed in its final form in terms of the measured physical properties of fracture strength, effective modulus of elasticity, and coefficient of thermal expansion. The model was applied to existent thermal stress data of ceramic materials for which these physical properties had been measured. On the basis of these data it was concluded that the thermal stress resistance of a material may be improved by increasing the fracture strength. Author

N74-28239*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPUTER PROGRAMS FOR PRESSURIZATION (RAMP) AND PRESSURIZED EXPULSION FROM A CRYOGENIC LIQUID PROPELLANT TANK
Philip A. Masters Washington Jul. 1974 89 p refs
(NASA-TN-D-7504; E-7654) Avail: NTIS HC $4.00 CSCL 21H

An analysis to predict the pressurant gas requirements for the discharge of cryogenic liquid propellants from storage tanks is presented, along with an algorithm and two computer programs. One program deals with the pressurization (ramp) phase of bringing the propellant tank up to its operating pressure. The method of analysis involves a numerical solution of the temperature and velocity functions for the tank ullage at a discrete set of points in time and space. The input requirements of the program are the initial ullage conditions, the initial temperature and pressure of the pressurant gas, and the time for the expulsion or the ramp. Computations are performed which determine the heat transfer between the ullage gas and the tank wall. Heat transfer to the liquid interface and to the hardware components may be included in the analysis. The program output includes predictions of mass of pressurant required, total energy transfer, and wall and ullage temperatures. The analysis, the algorithm, a complete description of input and output, and the FORTRAN 4 program listings are presented. Sample cases are included to illustrate use of the programs. Author

N74-28240*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FLIGHT VELOCITY EFFECTS ON THE JET NOISE OF SEVERAL VARIATIONS OF A 104-TUBE SUPPRESSOR NOZZLE
Richard R. Burley Washington Jul. 1974 53 p refs
(NASA-TM-X-3049; E-7901) Avail: NTIS HC $3.75 CSCL 21E

At the relatively high takeoff speeds of supersonic transport aircraft, an important question concerns whether the flight speed affects the noise of suppressor nozzles. To answer this question, flyover and static tests using a modified F-106B aircraft were conducted on a 104-tube suppressor nozzle. Comparison of adjusted flyover and static spectra indicated that flight velocity had a small adverse effect on the suppression of the 104-tube suppressor. The adverse effect was larger with the acoustic shroud installed than without it. Author

N74-28241*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CRUISE PERFORMANCE OF AN ISOLATED 1.15 PRESSURE RATIO TURBOFAN PROPULSION SYSTEM SIMULATOR AT MACH NUMBERS FROM 0.6 TO 0.85
Fred W. Steffen Washington Jun. 1974 52 p refs
(NASA-TM-X-3064; E-7824) Avail: NTIS HC $3.75 CSCL 21E

An isolated 1.15 pressure ratio turbofan engine simulator was tested at Mach numbers from 0.6 to 0.85. At Mach 0.75 the net propulsive force of the fan and nacelle (excluding core thrust) was 73 percent of the ideal fan net thrust. Internal losses amounted to 7 percent, and external drag amounted to 20 percent of the ideal fan net thrust. External pressure and friction drag were about equal. The propulsive efficiency with a 90 percent efficient fan would have been 63 percent. For the aerodynamic characteristics of the nacelle that was tested, increasing the fan pressure ratio to approximately 1.35 would have resulted in a maximum propulsive efficiency of 67 percent. Author

N74-28242# Royal Aircraft Establishment, Farnborough (England).
THE EFFECT OF THE INCOMING FLOW ON THE BEHAVIOR OF A TURBINE ROTOR
Hans Friedrich Jan. 1974 17 p refs Transl. into ENGLISH from Brennstoff-Warme-Kraft (Duesseldorf), v. 8, no. 1, 1956 p 9-15
(RAE-Lib-Trans-1733; BR39732) Avail: NTIS HC $4.00

Experiments on a one-stage turbine with rotating rotor have been evaluated for a sharp-edged laminar profile and a rounded over-pressure profile. The incoming flow angle was varied by altering the speed of rotation while keeping the stage head unaltered. An incoming flow having the same direction as the tangent to the mean camber line ('shock-free entry') lies in the region of maximum internal efficiency of the blading. For incoming flow on the pressure side ('lower shock'), both the internal efficiency and velocity coefficient of the rotor decrease markedly as the angular deviation increases. For incoming flow on the suction side ('upper shock') the efficiency only weakly decreasing and, until large angular deviations are reached, the blade efficiency and the velocity coefficient of the rotor blade vary but little. For rotating turbine wheels, then, one should strive for incoming flow on the suction side, just as with single wings. The rounded profile turns out to be less sensitive to the incoming flow than the sharp inlet edge. Author

N74-28243# McDonnell Aircraft Co., St. Louis, Mo.
MANUFACTURING METHODS FOR SELF-SEALING FUEL LINES Final Technical Report, 10 May 1972 - 10 Sep. 1973
J. H. Pousson and E. W. Wiggins Sep. 1973 55 p refs
(Contract F33615-72-C-1391; AF Proj. 445-2)
(AD-778083; AFML-TR-73-176) Avail: NTIS CSCL 21/5

The report covers the establishment of manufacturing process parameters to permit the use of the braiding process in manufacturing lightweight, reproducible, and economical self-sealing fuel lines for combat aircraft. Tests were conducted in Phase I to determine the required overbraid on aluminum, stainless steel, and titanium fuel lines to eliminate deformation and control petalling which results from an impact with a .50-caliber, armor-piercing projectile. The Phase II portion of the program involved establishing the braiding process as a means of applying a cover over the sealant material. (Modified author abstract) GRA

N74-28244# Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
IDENTIFICATION OF KINETIC PERFORMANCE LOSSES OF NTO/MMH Final Report, Jul. 1972 - 31 Aug. 1973
Fred S. Andes, III Feb. 1974 44 p refs
(AF Proj. 3058)
(AD-777893; AFRPL-TR-73-102) Avail: NTIS CSCL 21/8

The objective of the kinetically designed nozzle in-house program was to determine whether an increase in performance could be obtained over present conventional isentropic nozzle design techniques by considering nonequilibrium chemistry effects in the design process. It was structured as a three phase program. Phase I included a parametric study to analytically determine if there was a significant increase in nozzle performance to be gained using the kinetically designed nozzle analytical model for a general multi-component reacting gas. The results of this study would then be used to decide whether to proceed to the next two phases that would entail the fabrication and testing of several nozzles. Unfortunately, the KDN computer program could not be made to work right with the NTO/MMH propellant combination and this entire effort had to be terminated short of its original goal. (Modified author abstract) GRA

N74-28245# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
SUB-OPTIMAL CONTROL OF A GAS TURBINE ENGINE M.S. Thesis
Robert John Bowles Dec. 1973 126 p refs
(AD-777852; GE/EE/73A-1) Avail: NTIS CSCL 21/5

Gas turbine engine technology has been advanced to the point where it is increasingly difficult to apply conventional feedback control theory to the design of its necessary multiple-input and multiple-output control systems. Modern linear control theory was applied to the engine control problem in four stages. Stage 1 involved formulating a simple, reliable, and representative mathematical model of the engine and describing the model in state variable form. Stage 2 involved using a truncated Taylor series to linearize the engine state equations about a succession of engine equilibrium points and solving the linear optimal output regulator problem and the linear optimal tracking problem to minimize a quadratic Performance Index. In stage 3, the engine model was simulated on a digital computer via the MIMIC Simulation Language. The engine control laws were then realized in a FORTRAN function sub-program. Stage 4 consisted of testing the controlled engine for various throttle demands to verify the satisfactory operation of the controller. Author (GRA)

N74-28388* Kanner (Leo) Associates, Redwood City, Calif.
REDUCTION OF DIESEL ENGINE EXHAUST NOISE IN THE PETROLEUM MINING INDUSTRY
Tatiana Marinov *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 156-162 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica, Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 205-211 (For availability see N74-28363 17-32)
CSCL 21A

29 SPACE RADIATION

Includes cosmic radiation; solar flares; solar radiation; and Van Allen radiation belts. For related information see also 13 Geophysics, and 24 Physics, Atomic, Molecular, and Nuclear.

N74-28246*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PROCESSINGS OF THE WORKSHOP ON ELECTRON CONTAMINATION IN X-RAY ASTRONOMY EXPERIMENTS
Stephen S. Holt, ed. May 1974 168 p refs Workshop held at Washington, D. C., 26 Apr. 1974
(NASA-TM-X-70673; X-661-74-130) Avail: NTIS HC $11.50 CSCL 03A

The proceedings of a conference to investigate the effects of extraterrestrial radiation and particle contamination of X-ray astronomical data are presented. The subjects discussed include the following: (1) electrons at low altitudes which affect soft X-ray astronomy, (2) the geographical distribution of 100 keV electrons above the earth's atmosphere, (3) midlatitude electron precipitation, (4) particle background observed by X-ray detectors on board Copernicus satellite, and (5) a survey of trapped low energy electrons near the inner boundary of the inner radiation zone as determined by OSO-7. For individual titles, see N74-28247 through N74-28257.

N74-28247* California Univ., Livermore. Lawrence Livermore Lab.
ELECTRONS AT LOW ALTITUDES: A DIFFICULT BACKGROUND PROBLEM FOR SOFT X-RAY ASTRONOMY
c30
F. D. Seward, R. J. Grader, A. Toor, G. A. Burginyon, and R. W. Hill *In* NASA. Goddard Space Flight Center Proc. of the Workshop on Electron contamination in X-ray Astronomy Expt. May 1974 25 p refs Sponsored by AEC (For availability see N74-28246 17-29)
(UCRL-51470) CSCL 03A

Quasi-trapped and precipitating electrons have been observed with rocket-borne X-ray astronomy detectors in the altitude range 150 to 500 km. Because the flights occured at low magnetic latitudes the electrons were unexpected. Data from many flights are combined to derive altitude dependence, an average electron spectrum, and variation with solar activity. Development of electron-rejecting collimators is discussed, and laboratory and flight data on these collimators are presented. Author

N74-28248* California Univ., Livermore. Lawrence Livermore Lab.
THE GEOGRAPHICAL DISTRIBUTION OF DIFFERENCE 100-keV ELECTRONS ABOVE THE EARTH'S ATMOSPHERE
F. D. Seward *In* NASA. Goddard Space Flight Center Proc. of the Workshop on Electron Contamination in X-ray Astronomy Expt. May 1974 6 P refs Sponsored by AEC (For availability see N74-28246 17-29)
(UCRL-51456) CSCL 03B

Modern soft X-ray astronomical observations are made with large-area proportional counters that have very thin plastic windows. The counters are consequently very sensitive to low energy electrons. An electron with only a few keV of energy can penetrate a typical window, and a flux of approximately 100 electrons per square centimeter sec-ster can double the background counting rate during a typical observation. These electrons produce an undersiable effect which, is impossible to distinguish from X ray data. Consequently, an electron-free region is needed for accurate astronomical observations. Geographical regions of weak electron flux from low altitude satellite data are derived. These regions can be compared with the locations of rocket launching sites. The best sites should be those farthest from electron regions. Author

N74-28249* Nagoya Univ. (Japan). Dept. of Physics.
QUASITRAPPED ELECTRONS IN THE LOW L REGION. PRELIMINARY RESULTS OF A ROCKET OBSERVATION ON 22 JANUARY 1972
S. Hayakawa, T. Kohno, F. Nagase, and Y. Tanaka *In* NASA. Goddard Space Flight Center Proc. of the Workshop on Electron Contamination in X-ray Astronomy Expt. May 1974 12 p refs (For availability see N74-28246 17-29)
Avail: NTIS CSCL 03B

Suprathermal electrons in the energy range 5 - 100 keV were measured with thin-window proportional counters on board a sounding rocket. The flux of the electrons was found to increase with altitude in the range .100 - 550 km, corresponding to L = 1.15 - 1.22, the angular distribution to be peaked in the direction perpendicular to the geomagnetic line of force, and the energy to be represented by a power law. Author

N74-28250* Texas Univ., Dallas.
LOW ENERGY (10eV TO 10 keV) EQUATORIAL PARTICLE FLUXES AND SOFT PARTICLE FLUXES NEAR THE EQUATOR
J. D. Winningham and W. J. Heikkila *In* NASA. Goddard Space Flight Center Proc. of the Workshop on Electron Contamination in X-ray Astronomy Expt. May 1974 9 p refs

(For availability see N74-28246 17-29)
(Contract NAS5-9112)
CSCL 03B

Several spectra are shown that represent one rotation of ISIS-1. Spectra 1, 2, 3, represent particles moving down the field line into northern ionosphere and spectra 4, 5, 6 represent particles moving up field lines towards the magnetic equator. The former are direct fluxes and the latter are albedo fluxes. The spectra observed are remarkably similar to these observed in the auroral zone. The direct fluxes exhibit a relative maximum in the few keV range and the albedo a power low spectrum with increased fluxes at low energies. Examination of concurrent topside sounder data on ISIS-1 revealed a positive correlation between a region of turbulent ionosphere and particle fluxes. This ionospheric condition is referred to as equatorial spread F and has been studied extensively with bottomside ionospheric sounders and backscatter radars. The perigee of ISIS crossed the magnetic equator at four local times (0400, 1000, 1600, 2100) during the lifetime of the particle spectrometer. No fluxes were observed at 0400 and 1000 local time. At 1600 a few instances of particles were observed. At 2100 essentially all passes included detectable equatorial fluxes. This is in agreement with the frequency of occurence of equatorial spread F. Author

N74-28251* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AE-LEE MEASUREMENTS AT LOW AND MID LATITUDE
R. A. Hoffman, J. L. Burch, and R. J. Janetzke *In its* Proc. of the Workshop on Electron Contamination in X-ray Astronomy Expt. May 1974 14 p refs (For availability see N74-28246 17-29)
CSCL 03B

Shortly after the Low Energy Electron Experiment (LEE) on the Atmosphere Explorer-C was turned on following launch, an unexpected phenomenon was encountered at mid-latitudes, a counting rate was acquired with one maximum per roll. Recent analysis shows that these counting rates occur when the detectors are looking in the ram direction of the spacecraft and the spacecraft is near perigee, and are indeed not due to properly analyzed charged particles. After showing the probable cause of these counting rates, some upper limits to true fluxes at low altitudes in the energy range 200 eV to 25 keV from the LEE experiment are shown. OGO-4 data taken at mid-latitudes are included.
Author

N74-28252* Maryland Univ., College Park. Inst. for Fluid Dynamics and Applied Mathematics.
MIDLATITUDE ELECTRON PRECIPITATION: A POSSIBLE SOURCE OF CONTAMINATION OF GALACTIC X AND GAMMA-RAY MEASUREMENTS
T. J. Rosenberg *In* NASA. Goddard Space Flight Center Proc. of the Workshop on Electron Contamination in X-ray Astronomy Expt. May 1974 14 p refs (For availability see N74-28246 17-29)
(Grant NSF GV-28841X)
CSCL 03B

The effect of trapped and precipitated particles in the magnetosphere on the measurement of galactic X-rays and gamma rays is discussed. To minimize contamination caused by electron precipitation, most galactic X-ray and gamma ray measurements are conducted at equatorial or relatively low to middle latitudes where the influence of auroral effects is expected to be small. Substorm-related VLF phase perturbations also affect the measurements. If such perturbation are indicative of electron precipitation at middle to low latitudes, then their relatively high frequency of occurrence, as many as 100 per year, is evidence that electron precipitation at these latitudes may pose a problem to some galactic X-ray and gamma ray measurements. Charts and maps are presented to show: (1) phase recordings from sixteen sub-ionospheric VLF propagation paths, (2) map of great circle propagation paths, (3) ionization rates in the nighttime ionosphere due to several sources, and (4) computer phase variation for the NLK-APL path versus electron flux for different e-folding energies. Author

N74-28253* Naval Research Lab., Washington, D.C. Hulburt (E. O.) Center for Space Research.
ELECTRON CONTAMINATION IN A MID-LATITUDE SOFT X-RAY ASTRONOMY EXPERIMENT DURING AN INTENSE MAGNETIC STORM
S. Naranan, H. Friedman, G. Fritz, R. C. Henry, and S. Shulman *In* NASA. Goddard Space Flight Center Proc. of the Workshop on Electron Contamination in X-ray Astronomy Expt. May 1974 21 p refs (For availability see N74-28246 17-29)
CSCL 03B

A large area X-ray sky survey payload was launched from White Sands Missile Range (106 deg W 32 deg N) on 1 Nov. 1972 at 0530 hours U.T. The launch time coincided with intense geomagnetic activity (3 hour K sub p index = 8) following a solar flare. The data have been analyzed to determine possible contamination of X-ray data by large fluxes of low energy electrons that can precipitate down to low altitudes during magnetic storms. There is clear evidence in the data for low energy electrons of 10 - 50 keV contributing appreciably at about 200 km altitude in the 1 - 10 keV X-ray energy channels of the proportional counters used for the X-ray observations. The McIlwain parameters L and B for this altitude at White Sands are 1.25 and 0.46G, respectively. Author

N74-28254* Wisconsin Univ., Madison. Dept. of Physics.
SOFT X-RAY BREMSSTRAHLUNG AND FLUORESCENT LINE PRODUCTION IN THE ATMOSPHERE BY LOW ENERGY ELECTRONS
W. Kraushaar *In* NASA. Goddard Space Flight Center Proc. of the Workshop on Electron Contamination in X-ray Astronomy Expt. May 1974 10 p refs (For availability see N74-28246 17-29)
(Grant NGL-50-002-044)
CSCL 03B

The effect of low energy quasi-trapped or precipitating electrons which impact on the counter windows of soft X-ray detectors are discussed. The errors caused by X-rays produced in the residual atmosphere above a rocket-borne detector because of the resemblance to X-rays of cosmic origin are examined. The design and development of counter windows which make it possible to identify the atmospherically produced X-rays are described. Curves are presented to show the following: (1) preliminary low energy electron data from Atmospheric Explorer C, (2) X-ray flux in electron-excited nitrogen and oxygen, (3) typical proportional counter response to low energy cosmic rays, and (4) proportional counter response to X-radiation produced by electrons incident upon a gas of oxygen to nitrogen number of 0.4. Author

N74-28255* Smithsonian Astrophysical Observatory, Cambridge, Mass. Center for Astrophysics.
GEOMAGNETIC BACKGROUND EVENTS OBSERVED BY UHURU
Daniel A. Schwartz *In* NASA. Goddard Space Flight Center Proc. of the Workshop on Electron. Contamination in X-ray Astronomy Expt. Jun. 1974 18 p refs (For availability see N74-28246 17-29)
CSCL 03B

Problems due to sporadic background events observed by Uhuru (Small Astronomy Satellite - A) do not compromise the study of discrete X-ray sources. Nevertheless, direct particle effects and auroral type X-ray events in the atmosphere may occasionally occur. Therefore, even on the geomagnetic equator, an experiment must be prepared to recognize and eliminate such events when the ultimate level of sensitivity is desired. The test equipment contained in the satellite and the orbital mechanics of Small Astronomy Satellite - A are described. The sporadic events which were observed by the satellite are analyzed. Author

N74-28256* University Coll., London (England). Mullard Space Science Lab.
THE PARTICLE BACKGROUND OBSERVED BY THE X-RAY DETECTORS ONBOARD COPERNICUS
P. J. N. Davison *In* NASA. Goddard Space Flight Center Proc. of the Workshop on Electron Contamination in X-ray Astronomy Expt. May 1974 12 p (For availability see N74-28246 17-29)
CSCL 03B

The design and characteristics of low energy detectors on the Copernicus satellite are described. The functions of the sensors in obtaining data on the particle background. The procedure for processing the data obtained by the satellite is examined. The

most significant positive deviations are caused by known weak X-ray sources in the field of view. In addition to small systemic effects, occasional random effects where the count rate increases suddenly and decreases within a few frames are analyzed.
Author

N74-28257* Massachusetts Inst. of Tech., Cambridge. Dept. of Physics.
A SURVEY OF TRAPPED LOW ENERGY ELECTRONS NEAR THE INNER BOUNDARY OF THE INNER RADIATION ZONE FROM THE OSO-7
J. E. Neighbours and G. W. Clark *In* NASA. Goddard Space Flight Center Proc. of the Workshop on Electron Contamination in X-ray Astronomy Expt. May 1974 21 p refs (For availability see N74-28246 17-29)
(Contract NAS5-11082)
(CSR-P-74-119) CSCL 03B

Data from the MIT X-ray experiment on the OSO-7 satellite were used to delineate the regions in B-L and geographic spaces where trapped radiation was encountered. The results pertain specifically to electrons with energies in a range of 10 keV centered on 55 keV which were encountered in an orbit between altitudes of 330 and 570 km and latitudes of 33.3 degrees. A typical pitch angle distribution is fitted by a Gaussian with a FWHM of 28 degrees.
Author

N74-28258# National Research Council of Canada, Ottawa (Ontario). Radio and Electrical Engineering Div.
OBSERVATIONS OF SOLAR FLUX AT THE ALGONQUIN RADIO OBSERVATORY ON 2800 MHz AND AT THE DOMINION RADIO ASTROPHYSICAL OBSERVATORY ON 2700 MHz Monthly Reports, Jan. - Dec. 1972
A. E. Covington, H. P. Gagnon, and J. D. Moore Jun. 1973 89 p refs
(NRC-13411) Avail: NTIS HC $7.50 CSCL 03B

Detailed tabulations of the solar radio flux for 1972 observed on a frequency of 2800 MHz at the Algonquin Radio Observatory and on 2700 MHz at the Dominion Radio Astrophysical Observatory are given. Convenient tables of daily flux for the whole year are presented.
Author

N74-28259*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERPLANETARY SHOCK WAVES ASSOCIATED WITH SOLAR FLARES
J. K. Chao and K. Sakurai Jun. 1974 48 p
(NASA-TM-X-70683; X-693-74-168) Avail: NTIS HC $5.50 CSCL 03B

The interaction of the earth's magnetic field with the solar wind is discussed with emphasis on the influence of solar flares. The geomagnetic storms are considerered to be the result of the arrival of shock wave generated by solar flares in interplanetary space. Basic processes in the solar atmosphere and interplanetary space, and hydromagnetic disturbances associated with the solar flares are discussed along with observational and theoretical problems of interplanetary shock waves. The origin of interplanetary shock waves is also discussed.
F.O.S.

N74-28260*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COORDINATE TRANSFORMATIONS FOR STUDIES OF INTERACTIONS BETWEEN INTERPLANETARY AND GEOMAGNETIC FIELDS
J. L. Burch and R. W. Janetzke Apr. 1974 19 p refs Submitted for publication
(NASA-TM-X-70684; X-621-74-179) Avail: NTIS HC $4.00 CSCL 03B

A graphical procedure is provided for performing coordinate transformations between the geocentric-solar-equatorial, geocentric-solar-ecliptic and geocentric-solar-magnetospheric coordinate systems. The procedure is designed to facilitate intercomparision of previous studies of interactions between interplanetary and geomagnetic fields that made use of these coordinate systems. The interaction in the geocentric-solar-magnetosphere system has been shown to give the most consistent results.
Author

N74-28261*# National Aeronautics and Space Administration.
THE SOLAR CYCLE VARIATION OF THE SOLAR WIND HELIUM ABUNDANCE
K. W. Ogilvie (National Center for Atmospheric Res.) and J. Hirshberg Jun. 1974 37 p refs Submitted for publication Sponsored in part by NSF
(NASA-TM-X-70685; X-690-74-187) Avail: NTIS HC $5.00 CSCL 03B

A critical survey was made of the experimental evidence for a variation of the relative abundance by number h, (n alpha/np), of helium in the solar wind. The abundance is found to vary by delta h = 0.01 + or - 0.01 from 0.035 to 0.045 over solar cycle 20. Changes in the average bulk speed during the solar activity cycle was insufficient to account for this increase in $<h>$ with the solar cycle. The slope of the linear relation between h and the plasma bulk speed is also found to vary, being greatest around solar maximum. An attempt is made to explain the 30% variation in $<h>$ as the result of the variation in the number of major solar flares over a solar cycle. These obvious transients are apparently not numerous enough to explain the observed variation, but the reasonable expectation remains that the transients observed recently by Skylab which may occur more frequently than major flares could augment those associated with major flares. Since the solar wind flux is not observed to increase at solar maximum, the abundance of Helium cannot be proportional to the proton flux leaving the sun unless the solar wind comes from a smaller area of the sun at maximum than at minimum.
Author

N74-28262# Aerospace Corp., El Segundo, Calif. Space Physics Lab.
THE CORONAL X-SPECTRUM: PROBLEMS AND PROSPECTS
Arthur B. C. Walker, Jr. 20 Mar. 1974 113 p refs
(Contract F04701-73-C-0074)
(AD-777169; TR-0074(9260-02)-3; SAMSO-TR-74-69) Avail: NTIS CSCL 03/2

The advent of rocket and satellite borne EUV and X-ray spectrometers has resulted in a study of the permitted lines of the highly ionized ion in the solar corona and transition region. Models of the coronal temperature and density structure and of coronal abundances have been developed from these observations. However, spectroscopic studies with high spatial resolution are rare, and substantial progress in the study of coronal structure and of the coronal energy balance will require the development of true EUV and X-ray spectroheliographs.
Author (GRA)

N74-28263# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
A PHYSICAL MECHANISM FOR THE PRODUCTION OF SPOT RELATED SOLAR PROMINENCES Physical Sciences Research Papers
Marvin L. White 18 Jan. 1974 27 p refs
(AF Proj. 8608)
(AD-778088; AFCRL-TR-74-0043; AFCRL-PSRP-584) Avail: NTIS CSCL 03/2

It is shown in this report that a charge separation electric field (produced by the interaction of Evershed flow with the spot magnetic field) can drive electrical currents upward along magnetic lines that link the photosphere with the upper solar atmosphere. The form and dynamics of the typical two-ribbon flare and their relation to spot related prominences are also considered. (Modified author abstract)
GRA

N74-28264# Aerospace Corp., El Segundo, Calif.
RELATIVE CORONAL ABUNDANCES DERIVED FROM X-RAY OBSERVATIONS OF NITROGEN, OXYGEN, NEON, MAGNESIUM, AND IRON Technical Report, Jul. 1969 - Dec. 1973
Arthur B. C. Walker, Jr., Hugo R. Rugge, and Kay Weiss 29 Mar. 1974 43 p refs
(Contract F04701-73-C-0074)
(AD-777813; TR-0074(9260-02)-4; SAMSO-TR-74-80) Avail: NTIS CSCL 03/2

The authors have observed the coronal spectrum between 8.5 and 25 A with the crystal spectrometer on the OV1-10 satellites. The measured fluxes of the resonance lines of O VII, O VIII, Ne IX, Ne X, and Mg XI have been used to construct a

K. This model has been used to determine the relative abundances of O, Ne, and Mg. The relative abundances of N and Fe were also computed, using the observed intensities of the resonance lines of N VII and Fe XVII. The authors have used the coronal model based on the line fluxes to calculate the expected continuum fluxes, and compared these calculated fluxes with the observed contrinuum fluxes. (Modified author abstract) GRA

N74-28277* Kanner (Leo) Associates, Redwood City, Calif.
CHROMOSPHERIC FLARES AND SUDDEN COMMENCEMENTS OF GEOMAGNETIC STORMS
A. T. Nesmyanovich and E. I. Nesmyanovich *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 61-68 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 40-45 (For availability see N74-28272 17-30)
CSCL 03B

N74-28278* Kanner (Leo) Associates, Redwood City, Calif.
ACCELERATION OF SOLAR COSMIC RAYS DURING CHROMOSPHERIC FLARES
L. I. Dorman, L. B. Raychenko, and A. K. Yukhimuk *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 69-76 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 45-49 (For availability see N74-28272 17-30)
CSCL 03B

N74-28279* Kanner (Leo) Associates, Redwood City, Calif.
EFFECT OF SMALL FLARES IN THE NEUTRAL COMPONENT OF SECONDARY COSMIC RADIATION
V. I. Bondarenko, L. V. Raychenko, and A. K. Yukhimuk *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 77-85 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 50-55 (For availability see N74-28272 17-30)
CSCL 03B

N74-28280* Kanner (Leo) Associates, Redwood City, Calif.
ANALYSIS OF THE NATURE OF EXCESSIVE COSMIC RADIATION IN THE AREA OF THE BRAZILIAN MAGNETIC ANOMALY AT ALTITUDES 250-500km, FROM KOSMOS-225 SATELLITE DATA
L. V. Raychenko *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 86-94 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 55-60 (For availability see N74-28272 17-30)
CSCL 03B

N74-28282* Kanner (Leo) Associates, Redwood City, Calif.
POSSIBILITY OF USING SOURCES OF VACUUM ULTRAVIOLET IRRADIATION TO SOLVE PROBLEMS OF SPACE MATERIAL SCIENCE
E. T. Verkhoutseva and E. I. Yaremenko *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 102-123 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 66-79 (For availability see N74-28272 17-30)
CSCL 03B

30 SPACE SCIENCES

Includes astronomy and astrophysics; cosmology; lunar and planetary flight and exploration; and theoretical analysis of orbit and trajectory. For related information see also: 11 Facilities, Research and Support; and 31 Space Vehicles.

N74-28265 Cornell Univ., Ithaca, N.Y.
STUDIES OF PLANETARY ATMOSPHERES BY STELLAR OCCULATIONS Ph.D. Thesis
Lawrence Harvey Wasserman 1973 275 p
Avail: Univ. Microfilms Order No. 74-12654

The two basic methods of reducing occultation light curves - curve fitting and integral inversion - are reviewed and compared. It is shown that the curve fitting methods have severe problems of non-uniqueness. In addition, in the case of occultation curves dominated by spikes, it is not clear that such solutions are meaningful. The inversion method, which determines the refractivity profile of the atmosphere directly, does not suffer from these drawbacks. Methods of deriving temperature profiles from refractivity profiles are considered. It is shown that, although the temperature profiles are sensitive to small errors in the refractivity profile, accurate temperatures can be obtained, particularly at the deeper levels of the atmosphere.
Dissert. Abstr.

N74-28266 California Univ., San Diego.
STUDIES OF SMALL BODIES IN THE SOLAR SYSTEM Ph.D. Thesis
Wing-Kuen Ip 1974 185 p
Avail: Univ. Microfilms Order No. 74-12811

The orbital evolution of the Apollo asteroids 1620 Geographos and 1685 Toro and Amor asteroids 433 Eros, 1221 Amor, and 1627 Ivar are investigated by numerical integration. All these asteroids, with the exception of Geographos, exhibit systematic orbital couplings with the Earth during the time interval studied (1600 - 2350 AD). 1685 Toro is captured into libration once with Venus due to the 13:5 resonance, and once with the Earth due to the 8:5 resonance. Both librations are ustable because of the effect of the 13:8 near commensurability of the Venus-Earth system. 433 Eros exhibits no libration pattern: the regular variation of its orbital period is due to the beat-effect of the 4:7 resonance with the Earth. The libration of 1221 Amor due to the 8:3 resonance with the Earth is found to be unstable. On the other hand, the libration of 1627 Ivar with respect to the Earth due to the 1128 resonance appears to be rather stable, at least during the time period we have studied. Dissert. Abstr.

N74-28267 Cornell Univ., New York.
ALIGNED ROTATING MAGNETOSPHERES Ph.D. Thesis
Ernst Theodor Scharlemann 1973 107 p
Avail: Univ. Microfilms Order No. 74-10199

This dissertation considers the problem of finding a self-consistent steady-state axisymmetric solution for the electromagnetic field around a rotating, perfectly conducting star, subject to the further simplifying assumptions that collisional, gravitational, and inertial forces are negligible. Inertial forces (still assumed small) are then included to determine the electron and ion velocities and densities uniquely. The basic equation for the magnetic field is derived, and found to be a quasi-linear elliptic partial differential equation, when written as an equation for the poloidal magnetic potential A(r,z). The requirement that all physical field quantities remain non-singular at the light cylinder specifies a set of boundary conditions which appear to be sufficient to determine unique solutions within the light cylinder. The solutions can then be extended beyond the light cylinder.
Dissert. Abstr.

N74-28268 Cornell Univ., New York.
DECIMETER-WAVELENGTH STUDIES OF HYDROGEN AND CARBON RECOMBINATION LINE TOWARD GALACTIC NEBULAE Ph.D. Thesis
Vernon Lee Pankonin 1973 237 p
Avail: Univ. Microfilms Order No. 74-10892

New decimeter-wavelength recombination line observations in the lines of sight to selected galactic nebulae are reported. 247 alpha and/or 248 apha (approximately 0.43 GHz) and 221 alpha (approximately 0.6 GHz) spectra were obtained toward five positions in three well known H II regions visible to the 305m Arecibo telescope. The sources observed were: The A, B, and C components of the W51 complex, W49A, and the G206.0-2.1 component of the Rosette Nebula. Hydrogen recombination lines were detected in all spectra except at 221 alpha from W51C. Carbon recombination lines were detected at 247,248 alpha and 221 alpha from W51A and at 248 alpha from W51B. An unidentified line was detected in the 247,248 alpha spectrum of W49A. The C248 alpha lines signify the lowest frequency at which carbon has been detected. In addition, the

H248 alpha spectrum of W49A. The C248 alpha lines signify the lowest frequency at which carbon has been detected. In addition, the H248 alpha results represent the lowest frequency recombination line observations that have been successfully performed on the particular sources studied. Dissert. Abstr.

N74-28269 Princeton Univ., N.J.
THE EVOLUTION OF SUPERNOVA REMNANTS Ph.D. Thesis
Roger Alan Chevalier 1973 110 p
Avail: Univ. Microfilms Order No. 74-9668

The evoluton of supernova remnants is studied using a spherically symmetric hydrodynamic code with a magnetic field approximately included. Cooling by bremsstrahlung, line emission, and radiative recombination is included and properties of the emitted radiation are investigated. Particular attention is paid to the late phases when a dense neutral shell forms which accretes matter both from the interstellar medium and the hot interior. The shell absorbs hard ultraviolet and soft X-ray photons. The interstellar magnetic field produces the dominant pressure in the shell and determines its density and thickness. Numerical models of the remnant of a strong explosion in or near the plane of the galaxy are computed, taking into account the density gradient out of the plane. Special attention is given to the evolution of a blast in an exponential atmosphere, which can be scaled to a range of initial parameters. Dissert. Abstr.

N74-28270*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MAGNETISM AND THE INTERIOR OF THE MOON
Palmer Dyal, Curtis W. Parkin (Santa Clara Univ., Calif.), and William D. Daily (Brigham Young Univ., Provo, Utah.) Feb. 1974 110 p refs
(NASA-TM-X-62354) Avail: NTIS HC $4.50 CSCL 03B

The application of lunar magnetic field measurements to the study of properties of the lunar crust and deep interior is reviewed. Following a brief description of lunar magnetometers and the lunar magnetic environment, measurements of lunar remanent fields and their interaction with the solar plasma are discussed. The magnetization induction mode is considered with reference to lunar magnetic permeability and iron abundance calculations. Finally, electrical conductivity and temperature calculations from analyses of poloidal induction, for data taken in both the solar wind and in the geomagnetic tail, are reviewed. Author

N74-28271*# Linguistic Systems, Inc., Cambridge, Mass.
THE INTERNAL STRUCTURE OF THE EARTH, MOON AND PLANETS
V. N. Zharkov Washington NASA May 1974 65 p Transl. into ENGLISH of the publ. "Vnutrenneye Stroyeniye Zemli, Luny i Planet" Moscow, Zaniye, 1973 p 1-64
(Contract NASw-2482)
(NASA-TT-F-15411) Avail: NTIS HC $6.25 CSCL 03B

Geophysical methods are discussed which apply to the study of the internal structure of the earth. Seismology, gravimetry, the geomagnetic field, geothermics, and the study of substances at high pressures are also discussed. A description is given of proposed models of the internal structure of the earth and of the other planets in the solar system. Author

N74-28272*# Kanner (Leo) Associates, Redwood City, Calif.
SPACE RESEARCH IN THE UKRAINE. NO. 3: SPACE PHYSICS AND ASTRONOMY
Washington NASA May 1974 171 p refs Transl. into ENGLISH of the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 1-111
(Contract NASw-2481)
(NASA-TT-F-15537) Avail: NTIS HC $11.75 CSCL 03A

Research is reported that includes: studies on cosmic rays; electromagnetic processes in the atmospheres of pulsars; ionospheric physics and the propagation of radio waves from space objects; electromagnetic processes in the earth's magnetosphere and their relationship with chromospheric flares; studies of the moon and the planets of the solar system using astronomical methods, and advances in methodology and instrumentation. For individual titles, see N74-28273 through N74-28285.

N74-28273* Kanner (Leo) Associates, Redwood City, Calif.
LONG-TERM INTEGRATED RADIOPHYSICAL STUDIES OF THE IONOSPHERE, NEAR SPACE, AND THE PROPAGATION OF RADIO WAVES FROM SPACE OBJECTS
V. A. Misyura *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 1-28 refs Transl. into ENGLISH from the book, "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 3-20 (For availability see N74-28272 17-30)
CSCL 03B

The radiophysical studies reported consist of direct measurements of certain effects induced in the propagation of radio waves from space objects. From measured effects and from data on the motion and position of space objects, physical parameters of the medium and bodies are determined. Author

N74-28274* Kanner (Leo) Associates, Redwood City, Calif.
STUDY OF THE MOON AND PLANETS AT THE KHAR'KOV STATE UNIVERSITY ASTRONOMICAL OBSERVATORY
N. D. Barabashov *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 29-43 Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 21-30 (For availability see N74-28272 17-30)
CSCL 03A

The results of observations of the moon and planets are presented and include: (1) data on the discovery of high porosity values and the broken terrain of the lunar surface, and (2) data on the coloration of lunar rocks. A comparative description is given of data obtained by astronomical and by satellite observations. Author

N74-28275* Kanner (Leo) Associates, Redwood City, Calif.
ELECTROMAGNETIC PROCESSES IN THE ATMOSPHERE OF PULSARS c07
A. K. Yukhimuk *In its* Space Res. in the Ukraine, No. 3, (NASA-TT-F-15537) May 1974 p 44-53 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 31-36 (For availability see N74-28272 17-30)
CSCL 20N

The work consists of two parts. The first deals with the fine structure of radio pulses. Based on kinetic theory, processes occurring in the plasma shell of a pulsar when external electromagnetic radiation is present are investigated. It is shown that electromagnetic waves cause electrons to drift relative to ions, and initiate longitudinal oscillations. A dispersion equation describing the longitudinal oscillations in magnetized plasma is derived. Conditions for excitation of oscillations are found. Correlation functions of electron density are calculated, along with the coefficients of electromagnetic wave scattering. It is shown that variations in the amplitude of pulsar pulses are associated with scintillations caused by fluctuations in the plasma electron density. The second part of the study presents a mechanism for the radio emission of pulsars. The model of a rotating and a pulsating star, a neutron star with dipolar or more complex magnetic field, is examined. Author

N74-28276* Kanner (Leo) Associates, Redwood City, Calif.
DIURNAL AND SEASONAL TRENDS IN THE INCIDENCE OF SUDDEN COMMENCEMENTS (SC) AND SUDDEN IMPULSES SI
E. I. Nesmyanovich *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 54-68 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 37-40 (For availability see N74-28272 17-30)
CSCL 03B

Based on world data for the period 1 January 1955 to 31 December 1968, reports of 894 SC cases and 2152 SI cases were collected. A study was made of the diurnal and seasonal trends in the incidence of their appearances. It is shown that the diurnal trend is pronounced for all events with a maximum at (06-8)h universal time. The diurnal trend for SC in the resultant period is more pronounced. The seasonal trend in incidence of appearances of SC and SI is absent. Thus, geomagnetic disturbances of both SC and SI are monitored by world time. These results lead to the conclusion that the presence or

absence of SC and SI during geomagnetic storms is determined not only by the nature of the corpuscular flux, the presence of shock waves and tangential discontinuities, but also by purely terrestrial conditions. Author

N74-28277* Kanner (Leo) Associates, Redwood City, Calif.
CHROMOSPHERIC FLARES AND SUDDEN COMMENCEMENTS OF GEOMAGNETIC STORMS **c29**
A. T. Nesmyanovich and E. I. Nesmyanovich *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 61-68 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 40-45 (For availability see N74-28272 17-30)
CSCL 03B

A catalogue of flare activity was compiled during 1957-1967 (the solar activity cycle). By comparing all reliable SC during this period with chromospheric flares, the following conclusions are drawn: (1) There is no statistically significant correlation between SC and chromospheric flares. (2) The assumption that a shock wave propagates throughout the entire hemisphere is unjustified and contradicts the fact of recurrence of SC. (3) A statistically significant correlation was established between SC and chromospheric flares, that is, a relationship between a SC and the moment that a flare active region transits the Central Meridian. (4) SC are caused by shock waves or tangential discontinuities formed at the western boundary of the quasisteady directed corpuscular flux or at the boundary between sectors. Author

N74-28278* Kanner (Leo) Associates, Redwood City, Calif.
ACCELERATION OF SOLAR COSMIC RAYS DURING CHROMOSPHERIC FLARES **c29**
L. I. Dorman, L. B. Raychenko, and A. K. Yukhimuk *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 69-76 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 45-49 (For availability see N74-28272 17-30)
CSCL 03B

Using the Fokker-Planck equation, an examination is made of the acceleration of charged particles by fluctuational electric fields caused by the propagation of intense radio emission in the long-wave range. Correlation functions of electric fields near the boundary of plasma instability were computed. The interaction of charged particles with these fields is examined. It is shown that due to the interaction of particles with fluctuational fields, solar cosmic rays can be accelerated to energies of E = 100 to 1000 MeV. Author

N74-28279* Kanner (Leo) Associates, Redwood City, Calif.
EFFECT OF SMALL FLARES IN THE NEUTRAL COMPONENT OF SECONDARY COSMIC RADIATION **c29**
V. I. Bondarenko, L. V. Raychenko, and A. K. Yukhimuk *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 77-85 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 50-55 (For availability see N74-28272 17-30)
CSCL 03B

The results are presented of an investigation of the effect of small flares, scale divisions 1 and 1(+), in the neutron component of secondary cosmic radiation from the data of neutron supermonitors at the stations of Kiev, Bukhta Tiksi, and Deep River. It is shown that flares of scale divisions 1 and 1(+) are accompanied by an effect in the neutron component amounting to about 0.4%. A mechanism is presented for calculating the outflow of particles accelerated in small flares, owing to diffusion across the magnetic field of a trap. Author

N74-28280* Kanner (Leo) Associates, Redwood City, Calif.
ANALYSIS OF THE NATURE OF EXCESSIVE COSMIC RADIATION IN THE AREA OF THE BRAZILIAN MAGNETIC ANOMALY AT ALTITUDES 250-500km, FROM KOSMOS-225 SATELLITE DATA **c29**
L. V. Raychenko *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 86-94 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 55-60 (For availability see N74-28272 17-30)
CSCL 03B

Results are presented from a study of the region of anomalous cosmic radiation in the area of the Brazilian magnetic anomaly at the altitudes 250-500 km, using data measurements taken on the Kosmos-225 satellite (14-29 June 1968). The existence of a stable intensity anomaly discovered in the experiments on the second and third Soviet spacecraft-satellites is confirmed. The total vector of the geomagnetic field at different altitudes was compared with isoline maps. An altitude profile of the South Atlantic anomaly of radiation intensity was obtained, using data from the same instrument. The nature of the anomalies in cosmic radiation intensity over the regions of negative magnetic anomalies is discussed. Author

N74-28281* Kanner (Leo) Associates, Redwood City, Calif.
INSTRUMENTS FOR MEASURING RADIANT THERMAL FLUXES **c14**
O. A. Gerashenko and S. A. Sazhina *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 95-101 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 62-66 (For availability see N74-28272 17-30)
CSCL 14B

An absolute two-sided radiometer, designed on the principle of replacing absorbed radiant energy with electrical energy, is described. The sensitive element of the detector is a thermoelectric transducer of thermal flux. The fabrication technology, methods of measurement, technical characteristics, and general operation of the instrument are presented. Author

N74-28282* Kanner (Leo) Associates, Redwood City, Calif.
POSSIBILITY OF USING SOURCES OF VACUUM ULTRAVIOLET IRRADIATION TO SOLVE PROBLEMS OF SPACE MATERIAL SCIENCE **c29**
E. T. Verkhoutseva and E. I. Yaremenko *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 102-123 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 66-79 (For availability see N74-28272 17-30)
CSCL 03B

An urgent problem in space materials science is simulating the interaction of vacuum ultraviolet (VUV) of solar emission with solids in space conditions, that is, producing a light source with a distribution that approximates the distribution of solar energy. Information is presented on the distribution of the energy flux of VUV of solar radiation. Requirements that must be satisfied by the VUV source used for space materials science are formulated, and a critical evaluation is given of the possibilities of using existing sources for space materials science. From this evaluation it was established that none of the sources of VUV satisfies the specific requirements imposed on the simulator of solar radiation. A solution to the problem was found to be in the development of a new type of source based on exciting a supersonic gas jet flowing into vacuum with a sense electron beam. A description of this gas-jet source, along with its spectral and operation characteristics, is presented. Author

N74-28283* Kanner (Leo) Associates, Redwood City, Calif.
METHOD OF CALCULATING GAS DYNAMICS AND HEAT TRANSFER IN SINGLE STAGE REFRIGERATION UNITS **c33**
I. S. Zhitomirskiy and A. B. Popolskiy *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 124-138 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 80-90 (For availability see N74-28272 17-30)
CSCL 20M

A generalized mathematical model of gas-dynamic and heat transfer processes in single-stage regenerative installations operating in Stirling, MacMahon, Gifford-MacMahon, and pulsating tube cycles is proposed. A numerical method os solving initial equations on a digital computer is given. This makes it possible to calculate the change in the thermodynamic parameters in

the working cycle in different machine components, as well as the dependence of cold productivity on the temperature level in the steady regime. Author

N74-28284* Kanner (Leo) Associates, Redwood City, Calif.
PROBLEM OF SELECTING OPTIMAL REGIMES FOR STORAGE OF CRYOGENIC AGENTS c23
R. S. Mikhalchenko, V. F. Getmanets, and Yu. V. Iskhakov *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 139-154 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 91-101 (For availability see N74-28272 17-30)
CSCL 20K

A thermodynamic analysis is given of different regimes of storage of hydrogen, nitrogen, oxygen, and argon using the high vacuum of space. Optimal regimes are determined from the standpoint of minimizing weight characteristics. Several unique storage regimes are proposed. Author

N74-28285* Kanner (Leo) Associates, Redwood City, Calif.
INTERMEDIATE MEMORY DEVICES c07
G. V. Basalayev, A. B. Kmet, M. A. Rakov, and V. A. Tarasevich *In its* Space Res. in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 155-162 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 101-106 (For availability see N74-28272 17-30)
CSCL 17B

Several methods of transfer and processing of data whose practical implementation requires operational memory devices are described. Devices incorporating multistable elements are proposed and their main parameters are given. The possibility of using the proposed devices for storing information for transmission in space radio communications channels is examined. Author

N74-28286*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ANALYTICAL EXPRESSIONS FOR POSITION ERROR IN TRIANGULATION SOLUTION OF POINT IN SPACE FOR SEVERAL STATION CONFIGURATIONS
Sheila Ann T. Long Washington Jun. 1974 48 p refs (NASA-TN-D-7552; L-9235) Avail: NTIS HC $3.25 CSCL 22C

Analytical expressions are derived to first order for the rms position error in the triangulation solution of a point object in space for several ideal observation-station configurations. These expressions provide insights into the nature of the dependence of the rms position error on certain of the experimental parameters involved. The station geometries examined are: (1) the configuration of two arbitrarily located stations; (2) the symmetrical circular configuration of two or more stations with equal elevation angles; and (3) the circular configuration of more than two stations with equal elevation angles, when one of the stations is permitted to drift around the circle from its position of symmetry. The expressions for the rms position error are expressed as functions of the rms line-of-sight errors, the total number of stations of interest, and the elevation angles. Author

N74-28287*# Scientific Translation Service, Santa Barbara, Calif.
APPLIED PROBLEMS OF SPACE BALLISTICS
P. Ye. Elyasberg, ed. Washington NASA Apr. 1974 205 p refs Transl. into ENGLISH of the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 143 p (Contract NASw-2483)
(NASA-TT-F-15412) Avail: NTIS HC $13.25 CSCL 22C

Papers from the seminar of the Institute of Space Research, Academy of Science USSR are summarized. Summaries are devoted to problems of determining and correcting space trajectories and to problems of investigating optimum trajectories. Data are also devoted to the analysis of the effect of atmospheric drag on the evolution of satellite orbits, variations of atmospheric density, and questions of predicting atmospheric density for calculating artificial earth satellite orbits. For individual titles, see N74-28288 through N74-28297.

N74-28288* Scientific Translation Service, Santa Barbara, Calif.
ANALYSIS OF FLIGHT TRAJECTORIES USING THE GRAVITATIONAL FIELD OF JUPITER
B. Ts. Bakhshiyan, N. G. Khavenson, and P. Ye. Elyasberg *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 1-12 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 p 3-10 (For availability see N74-28287 17-30)
CSCL 22C

Spacecraft (SC) trajectories using the gravitational field of Jupiter for flight in the immediate vicinity of the sun and leaving the plane of the ecliptic are investigated. The optimal nominal trajectories are selected with an inclination to the plane of the ecliptic of 90 deg. (after the flight around Jupiter) and a given perihelion distance. The possibilities of observing the SC after loss of radio communications with it during the flight around Jupiter are investigated. Author

N74-28289* Scientific Translation Service, Santa Barbara, Calif.
ENTRANCE CORRIDORS INTO THE ATMOSPHERE OF A PLANET WITH EXECUTION OF THE SPACECRAFT CAPTURE MANEUVER BY AERODYNAMIC BRAKING
N. A. Eysmont *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 13-30 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 p 11-22 (For availability see N74-28287 17-30)
CSCL 22C

The possibilities of spacecraft transfer from a pre-entrance trajectory to a satellite orbit of a planet using aerodynamic braking in the atmosphere of the planet are analyzed. Available entrance corridors are determined depending on the aerodynamic characteristics of the craft and the parameters of the pre-entrance trajectories. Evaluations of the possibilities of accomplishing the transfer maneuvers depending on the errors in determining the pre-entrance trajectory are given. Author

N74-28290* Scientific Translation Service, Santa Barbara, Calif.
ON CALCULATING THE PARALLAX OF A DISTANT ARTIFICIAL SPACE OBJECT
V. I. Belenko and Z. S. Shilkina *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 31-36 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 p 22-26 (For availability see N74-28287 17-30)
CSCL 22C

The simplest calculation schemes for transforming the spherical coordinates of an object at a significant distance from the earth with changes in the observation position on its surface are described. The possibility of using them for transmitting the object coordinates from one observation point to another is evaluated. Author

N74-28291* Scientific Translation Service, Santa Barbara, Calif.
AN A POSTERIORI ALGORITHM FOR FILTERING INTERFERING PARAMETERS FOR INDEPENDENT SPACE NAVIGATION
G. A. Mersov *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 37-51 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistik" Moscow, Nauka Press, 1973 p 26-36 (For availability see N74-28287 17-30)
CSCL 22C

Navigation parameters are evaluated from measurements of quantities which depend linearly on the navigation parameters as well as on parameters not directly usable for navigation. In the case when the assumed calculated values of these parameters differ from their true values, the estimates can be shifted. An algorithm is proposed, which permits reducing the dispersion of the estimates of the navigation parameters. In accordance with the algorithm, the interfering parameter is estimated in the case when its absolute value exceeds an assumed threshold value. The results of calculations illustrating the effectiveness in applying the algorithm are presented for the case of a uniform distribution of the interfering parameters whose values do not equal zero. Author

N74-28292* Scientific Translation Service, Santa Barbara, Calif.
METHODS FOR DETERMINING AND PREDICTING ARTIFICIAL EARTH SATELLITE (AES) ORBITS WITH ERRORS PRESENT IN THE MATHEMATICAL DESCRIPTION OF THE MOTION
A. I. Nazarenko and L. G. Markova *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 52-95 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 p 36-68 (For availability see N74-28287 17-30)
CSCL 22C

The problem of determining and predicting AES trajectory parameters from the measurements under the conditions, when the first parts of the integrated equations of motion are calculated approximately is considered. Two methods for determining the estimates of the trajectory parameters are constructed on the basis of using the criterion of maximum a posteriori probability. The first method is based on concurrent analysis of the available measurements. The second method, is a generalization of the filtration algorithm of Calman-Beussi. An approach to the solution of the formulated problem based on the introduction of supplementary refineable parameters and the expansion of the state vector is also investigated. Author

N74-28293* Scientific Translation Service, Santa Barbara, Calif.
STATISTICAL ANALYSIS OF THE DAILY MEAN FLUCTUATIONS OF THE PARAMETERS FOR THE UPPER ATMOSPHERE OF THE EARTH c13
V. Ye. Chertoprud *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 96-133 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 p 68-93 (For availability see N74-28287 17-30)
CSCL 04A

The statistical properties of the response of the parabolic equation to small daily mean temperature fluctuations in the neutral atmosphere are discussed. A technique is described for obtaining the correlation functions of the response of this equation to white noise, and, in the final analysis, to steady state disturbances with a given autocorrelation function. The distribution of fluctuation dispersion with altitude and a determination of satellite slowing fluctuations caused by variations of soft solar X-rays of wavelength 40 tr 100 A are presented as examples. Formulation of the inverse problem is discussed to obtain the characteristics of the fluctuation source from the statistical properties of satellite slowing fluctuations and variations of activity indices. Author

N74-28294* Scientific Translation Service, Santa Barbara, Calif.
EVALUATION OF THE ACCURACY IN PREDICTING SHORT-PERIOD VARIATIONS OF THE ATMOSPHERIC DENSITY c13
M. I. Voyskovskiy, I. I. Volkov, N. I. Gryazev, B. V. Kugayenko, V. M. Sinitsyn, and P. Ye. Elyasberg *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 134-150 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 p 93-107 (For availability see N74-28287 17-30)
CSCL 04A

The possible accuracy in predicting the short period variations of the atmospheric density correlated with the solar radio emission intensity at 10.7 cm and with the geomagnetic disturbance indices is evaluated. The length of the prediction intervals under consideration ranges from several hours to three days. Tables and graphs are presented, which permit evaluation of the possible errors in calculating the density in the interval of altitudes 150 to 350 km. Author

N74-28295* Scientific Translation Service, Santa Barbara, Calif.
SEMIANNUAL VARIATIONS OF THE ATMOSPHERIC DENSITY AT ALTITUDE OF 200-300 km c13
A. M. Alferov *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 151-169 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 p 107-119 (For availability see N74-28287 17-30)
CSCL 04A

Some results of analyzing density variations of the atmosphere with half year period obtained from data on Kosmos AES drag over the period 1960 to 1970 are discussed. Comparison of the secular variation of the intensity of the semiannual density variations and the 11-year solar cycle indicates that the amplitude and nature of the observed variations depend not only on the level of solar activity, but also on the heliolatitude distribution of the activity centers. Author

N74-28296* Scientific Translation Service, Santa Barbara, Calif.
AERODYNAMICS OF SATELLITES AND THE DETERMINATION OF THE SURFACE-FLUX INTERACTION PARAMETERS FROM AES KOSMOS-166 AND KOSMOS-230 DRAG IN THE UPPER ATMOSPHERE OF THE EARTH
G. I. Zmiyevskaya *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 170-186 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 p 120-130 (For availability see N74-28287 17-30)
CSCL 22C

The possibility of refining atmospheric density variations determined from satellite drag of complex configurations is examined. Actual surface orientation of the satellites Proton-2 Proton-4, Kosmos-166 and Kosmos-230 with respect to the velocity vector of the oncoming flux with their motion in the earth's atmosphere is taken into account. Results of a numerical simulation of the surface-flux interaction are used for calculating the aerodynamic drag coefficients of these satellites. Evaluations of the accuracy in calculating drag coefficient, are presented. The surface-flux interaction parameters can be found by the method of least squares from data on the orbital drag attenuation of the satellites Kosmos-166 and Kosmos-230 assuming the reliability of the atmospheric model. Author

N74-28297* Scientific Translation Service, Santa Barbara, Calif.
MODIFICATIONS OF JACCHIA'S STATIC DIFFUSION MODELS OF THE UPPER ATMOSPHERE c13
M. A. Degtyarev *In its* Appl. Probl. of Space Ballistics (NASA-TT-F-15412) Apr. 1974 p 187-200 refs Transl. into ENGLISH from the book "Prikladnyye Zadachi Kosmicheskoy Ballistiki" Moscow, Nauka Press, 1973 p 131-139 (For availability see N74-28287 17-30)
CSCL 04A

Modifications of Jacchia's static diffusion models of the upper atmosphere are obtained. Algorithms for determining the density of the upper atmosphere, which satisfy the conditions of compactness and speed, are constructed with the help of these modifications. The suitability of considering various types of density variations is evaluated for problems in predicting AES motion. The density and temperature profiles of Jacchia's static models are compared. Author

N74-28298*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MAGNETIC FIELD OBSERVATIONS NEAR MERCURY: PRELIMINARY RESULTS FROM MARINER 10
N. F. Ness, K. W. Behannon, R. P. Lepping, Y. C. Whang, and K. H. Schatten May 1974 41 p refs Submitted for publication
(NASA-TM-X-70680; X-690-74-180) Avail: NTIS HC $5.25
CSCL 03B

Results are presented from a preliminary analysis of data obtained near Mercury by the NASA/GSFC Magnetic Field Experiment on Mariner 10. A very well developed, detached bow shock wave, which developed as the super-Alfvenic solar wind interacted with the planet Mercury was observed. A magnetosphere-like region, with maximum field strength of 98 gamma at closest approach (704 km altitude) was also observed, and was contained within boundaries similar to the terrestrial magnetopause. The obstacle deflecting the solar wind flow was global in size, but the origin of the enhanced magnetic field was not established. The most plausible explanation, considering the complete body of data, favored the conclusion that Mercury has an intrinsic magnetic field. Author

N74-28299*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
HIGH ENERGY GAMMA RAY ASTRONOMY
C. E. Fichtel Jun. 1974 38 p refs

(NASA-TM-X-70681; X-662-74-183) Avail: NTIS HC $5.00 CSCL 03A

The SAS-2 gamma ray experiment and its detection of celestial gamma rays are described. Data also cover intensity of high energy gamma rays, gamma ray distribution, gamma ray origin, and diffuse radiation. E.H.W.

N74-28300*# Texas Univ., Austin. Dept. of Astronomy.
LUNAR LASER RANGING DATA DEPOSITED IN THE NATIONAL SPACE SCIENCE DATA CENTER: FILTERED OBSERVATIONS FOR JULY THROUGH DECEMBER 1972 AND UNFILTERED PHOTON DECTIONS FOR JANUARY THROUGH JULY 1973
J. Derral Mulholland and Peter J. Shelus Jul. 1974 8 p refs
(Grant NGR-44-012-219)
(NASA-CR-138486) Avail: NTIS HC $4.00 CSCL 03B

The data acquired by the lunar laser ranging experiment are described for the six months period ending 31 December, 1972. The data are contained on two files of a binary tape written in card image format, using a CDC 6400/6600 computer. Photon detections, and unfiltered photon stops are included. F.O.S.

N74-28301*# Massachusetts Inst. of Tech., Cambridge. Center for Space Research.
SURFACE ELECTRICAL PROPERTIES EXPERIMENT. PART 2: THEORY OF RADIO-FREQUENCY INTERFEROMETRY IN GEOPHYSICAL SUBSURFACE PROBING Final Report
J. A. Kong and L. Tsang Apr. 1974 146 p refs
(Contract NAS9-11540)
(NASA-CR-134332; CSR-TR-74-2-Pt-2) Avail: NTIS HC $10.50 CSCL 03B

The radiation fields due to a horizontal electric dipole laid on the surface of a stratified medium were calculated using a geometrical optics approximation, a modal approach, and direct numerical integration. The solutions were obtained from the reflection coefficient formulation and written in integral forms. The calculated interference patterns are compared in terms of the usefulness of the methods used to obtain them. Scattering effects are also discussed and all numerical results for anisotropic and isotropic cases are presented. A.A.D.

N74-28302*# National Aeronautics and Space Administration, Washington, D.C.
QUASARS, PULSARS, BLACK HOLES AND HEAO'S
R. F. Doolitte, Ken Moritz, and R. D. C. Whilden 1974 22 p refs Reprinted Original contains color illustrations
(NASA-EP-120) Avail: NTIS MF $1.45; Avail: SOD HC $0.80 CSCL 03A

Astronomical surveys are discussed by large X-ray, gamma ray, and cosmic ray instruments carried onboard high-energy astronomy observatories. Quasars, pulsars, black holes, and the ultimate benefits of the new astronomy are briefly discussed. F.O.S.

N74-28303# Joint Publications Research Service, Arlington, Va.
SOVIET BLOC RESEARCH IN GEOPHYSICS, ASTRONOMY, AND SPACE NO. 327
27 Jun. 1974 73 p refs Transl. into ENGLISH from various Russian journals
(JPRS-62344) Avail: NTIS HC $6.75

Translations and abstracts of articles are presented on meteorology, oceanography, upper atmosphere and space research, astronomy and terrestrial geophysics, covering both science news and formal scientific reports. Published details of Soviet space spectaculars are included. Author

N74-28304# Joint Publications Research Service, Arlington, Va.
SOVIET BLOC RESEARCH IN GEOPHYSICS, ASTRONOMY, AND SPACE, NO. 326
13 Jun. 1974 51 p refs Transl. into ENGLISH from various Soviet bloc publications
(JPRS-62240) Avail: NTIS HC $5.75

A report, containing translations and abstracts of articles on meteorology, oceanography, upper atmosphere and space research, astronomy and terrestrial geophysics, covering both science news and formal scientific reports is given. Published details of Soviet space spectaculars are included. Author

N74-28305*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
COLLISIONLESS RELAXATION IN SPIRAL GALAXY MODELS
Frank Hohl Washington Jun. 1974 20 p refs
(NASA-TN-D-7561; L-9385) Avail: NTIS HC $3.00 CSCL 03B

The increase in random kinetic energy of stars by rapidly fluctuating gravitational fields (collisionless or violent relaxation) in disk galaxy models is investigated for three interaction potentials of the stars corresponding to (1) point stars, (2) rod stars of length 2 kpc, and (3) uniform density spherical stars of radius 2 kpc. To stabilize the galaxy against the large scale bar forming instability, a fixed field corresponding to a central core or halo component of stars was added with the stars containing at most 20 percent of the total mass of the galaxy. Considerable heating occurred for both the point stars and the rod stars, whereas the use of spherical stars resulted in a very low heating rate. The use of spherical stars with the resulting low heating rate will be desirable for the study of large scale galactic stability or density wave propagation, since collective heating effects will no longer mask the phenomena under study. Author

N74-28306*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ENERGETIC PARTICLES IN THE JOVIAN MAGNETOSPHERE
J. H. Trainor, F. B. McDonald, B. J. Teegarden, W. R. Webber (New Hampshire Univ., Durham), and E. C. Roelof (New Hampshire Univ., Durham) Jun. 1974 46 p refs Submitted for publication
(NASA-TM-X-70688; X-660-74-198) Avail: NTIS HC $5.50 CSCL 03B

A detailed account of the Pioneer 10 encounter with Jupiter is presented. Flux time histories of electrons and protons are given over a wide energy band. Proton and electron energy spectra are given at various Jovicentric distances. Proton spectra are shown to transform from a power law with indices in the 3-4.2 range to more nearly exponential forms in the inner regions. Extensive data are presented on the angular distributions of protons and electrons at various locations in the Jovicentric magnetosphere. In addition, a harmonic analysis of 1-2 MeV proton angular distributions was performed. Alpha/proton ratios are given as a function of Jovian radius and are compared to the earth and solar wind values. Author

N74-28307*# Stanford Univ., Calif. Inst. for Plasma Research.
OPTICAL RADIATION FROM THE CRAB PULSAR
P. A. Sturrock, V. Petrosian, and J. S. Turk Jun. 1974 35 p refs
(Grant NGR-05-020-668)
(NASA-CR-138573; SU-IPR-574) Avail: NTIS HC $4.75 CSCL 03A

Possible mechanisms for producing the optical radiation from the Crab pulsar are proposed and discussed. There are severe difficulties in interpreting the radiation as being produced by an incoherent process, whether it be synchrotron radiation, inverse-Compton radiation or curvature radiation. It is proposed therefore that radiation in the optical part of the spectrum is coherent. In the polar cap model, a small bunch of electrons and positrons forms near each primary electron as a result of the pair-production cascade process. Ambient electric fields give rise to energy separation, as a result of which either the electrons or positrons will dominate the radiation from each bunch. The roll-off in the infrared is ascribed to synchrotron absorption by electrons and positrons located between the surface of the star and the force-balance radius. Various consequences of this model, which may be subjected to observational test, are discussed. Author

N74-28308# Joint Publications Research Service, Arlington, Va.
CIRCULATION AND DUST CONTENT IN THE VENUSIAN ATMOSPHERE FOUND FROM WIND VELOCITY MEASUREMENTS BY THE VENERA-8 AUTOMATIC INTERPLANETARY

STATION
V. V. Kerzhanovich and M. Ya. Marov 19 Jun. 1974 9 p refs Transl. into ENGLISH from Dokl. Akad. Nauk. SSSR (USSR), v. 215, no. 3, 1974 p 554-557
(JPRS-62274) Avail: NTIS HC $4.00

Wind velocity in the Venusian atmosphere was investigated during the descent of the Venera 8 automatic interplanetary station and velocity measurements by the Doppler method included. M.C.F.

N74-28309*# Cornell Univ., Ithaca, N.Y. Center for Radiophysics and Space Research.
HADAMARD TRANSFORM SPECTROMETRY OF THE ATMOSPHERES OF EARTH AND JUPITER
Perry G. Phillips and Daniel A. Briotta, Jr. [1973] 12 p refs (Grant NGR-33-010-210; Contract F19628-71-C-0183)
(NASA-CR-138799) Avail: NTIS HC $4.00 CSCL 03B

A Hadamard-transform spectrometer was used to obtain a spectrum of Jupiter from 880-770/cm. Three ammonia absorption features stood out at 870, 851, and 833/cm. The general shape of the spectrum implied an atmosphere with a monotonically decreasing temperature profile up to the 125 K level. Transmission profiles of the earth's atmosphere were taken between 16 microns and 25 for five consecutive nights under varying amounts of atmospheric water and air mass. There are many saturated lines, but nightly variations were fairly constant and agreed well with a theoretical profile. These results show that the Hadamard-transform technique is a useful method for obtaining astronomical spectra. Author

N74-28310*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MSFC SKYLAB APOLLO TELESCOPE MOUNT EXPERIMENT SYSTEMS MISSION EVALUATION
A. F. White, Jr. Jun. 1974 187 p refs
(NASA-TM-X-64821) Avail: NTIS HC $5.50 CSCL 22C

A detailed evaluation is presented of the Skylab Apollo Telescope Mount experiments performance throughout the eight and one-half month Skylab Mission. Descriptions and the objectives of each instrument are included. The anomalies experienced, the causes, and corrective actions taken are discussed. Conclusions, based on evaluation of the performance of each instrument, are presented. Examples of the scientific data obtained, as well as a discussion of the quality and quantity of the data, are presented. Author

N74-28311*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MSFC SKYLAB APOLLO TELESCOPE MOUNT SUMMARY MISSION REPORT
A. R. Morse 28 Jun. 1974 142 p
(NASA-TM-X-64815) Avail: NTIS HC $4.75 CSCL 22A

A summary of the Apollo Telescope Mount (ATM) performance during the 8.5-month Skylab mission is presented. A brief description of each ATM system, system performance summaries, discussion of all significant ATM anomalies which occurred during the Skylab mission, and, in an appendix, a summary of the Skylab ATM Calibration Rocket Project (CALROC) are provided. The text is supplemented and amplified by photographs, drawings, curves, and tables. The report shows that the ATM not only met, but exceeded premission performance criteria, and that participation of man in space for this scientific investigation greatly enhanced the quality and quantity of the data attained. Author

N74-28312*# Scientific Translation Service, Santa Barbara, Calif.
INTERPLANETARY FLIGHT PREDICTION
Ts. V. Solovyev and Ye. V. Tarasov Washington NASA Jun. 1974 494 p refs Transl. into ENGLISH from "Prognozirovaniye Mezhplanetnykh Poletov" Moscow, Mashinostroyeniye press, 1973 400 p
(Contract NASw-2483)
(NASA-TT-F-15407) Avail: NTIS HC $27.75 CSCL 22A

Methods for calculating the ballistic design characteristics of interplanetary vehicles and determining the most favorable launch dates for flights to the planets are discussed. Possible schemes of spacecraft flight to other planets both with and without return of the vehicles to the Earth are examined. Special schemes of spacecraft flight to the Sun and planets when the gravitational fields of other planets, specifically Venus and Jupiter, are used to improve the ballistic characteristics are considered. Author

N74-28313*# Linguistic Systems, Inc., Cambridge, Mass.
ALGORITHMS FOR CALCULATING THE ORIENTATION OF THE PROGNOZ ARTIFICIAL EARTH SATELLITES
J. G. Khatskevich and N. A. Eysmont Washington NASA Jun. 1974 9 p Transl. into ENGLISH from the Russian report PR-150
(Contract NASw-2482)
(NASA-TT-F-15674; PR-150) Avail: NTIS HC $4.00 CSCL 22C

Algorithms are presented for calculating the orientation of the Prognoz series artificial earth satellites. Several different coordinate systems, including the Koenig coordinate system, are introduced and transition matrices from one coordinate system to another are discussed. Author

N74-28314# Consejo Superior de Investigaciones Cientificas, Madrid (Spain).
DIFFUSION OF THE COPERNICUS SYSTEM IN THE WORLD [DIFUSION DEL SISTEMA DE COPERNICO EN EL MUNDO]
Antonio Romana 1973 32 p In SPANISH
(Rept-31) Avail: NTIS HC $4.75

A history of the diffusion of Copernician ideas is presented. Beginning with his De Revolutionibus Orbium Celestium, his papers, and papers concerning his works are traced throughout Europe. Transl. by F.O.S.

N74-28315*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERPLANETARY MeV ELECTRONS OF JOVIAN ORIGIN
B. J. Teegarden, F. B. McDonald, J. H. Trainor, W. R. Webber (New Hampshire Univ.), and E. C. Roelof (New Hampshire Univ.) 1974 28 p refs Submitted for publication
(NASA-TM-X-70687; X-660-74-197) Avail: NTIS HC $4.50 CSCL 03B

Observations of low energy electron increases observed in interplanetary space on Pioneer 10 are reported as it approached Jupiter. These discrete bursts were several hundred times the normal quiet-time electron flux, and became more frequent as one approached Jupiter resulting in the quasi-continuous presence of large fluxes of these electrons in interplanetary space. It is noted that the integrated flux from quiet-time electrons is comparable to the integrated ambient electron flux itself. In addition, the spectrum of electrons observed in Jupiter's magnetosphere, on Pioneer 10 in interplanetary space near Jupiter, for the quiet-time increases near the earth, and for the ambient electron spectrum are all remarkably similar. These two lines of evidence suggest the possibility that Jupiter could be the source of most of the ambient electrons at low energies. Author

N74-28316*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
AN ANALYTICAL STUDY OF THE INTERACTION OF TECHNOLOGICAL AND ADMINISTRATIVE DECISION-MAKING IN THE DEFINING OF MARS PROJECT VIKING Ph.D. Thesis - Union College
James Francis McNulty Jun. 1974 566 p
(NASA-TM-X-70208) Avail: NTIS HC $31.50 CSCL 22A

An analysis of the history and background of the Mars Project Viking is presented. The organization and functions of the engineering group responsible for the project are defined. The design and configuration of the proposed space vehicle are examined. Illustrations and tables of data are provided to complete the coverage of the project. Author

N74-28317*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MSFC SKYLAB MISSION SEQUENCE EVALUATION
J. D. Hoverkamp Mar. 1974 114 p refs
(NASA-TM-X-64816) Avail: NTIS HC $4.50 CSCL 22C

Planned and actual major Skylab sequences are presented. Off-nominal events are highlighted. Differences between planned and actual events are discussed. Author

N74-28318*# Stanford Univ., Calif. Dept. of Geophysics.
EVALUATION AND DEVELOPMENTAL STUDIES OF POSSIBLE ACTIVE SEISMIC EXPERIMENTS DURING THE POST-APOLLO PERIOD Final Report, 1 Jul. 1968 - 30 Jun. 1974
Robert L. Kovach 30 Jun. 1974 16 p refs
(Grant NGL-05-020-232)
(NASA-CR-138816) Avail: NTIS HC $4.00 CSCL 03B

Seismic velocity studies pertinent to the lunar crust and mantle are briefly summarized. The compressional and shear wave velocities in loose aggregates are discussed along with the effects of temperature on seismic velocity in compacted powders. Abstracts of papers concerning the lunar structure are included. F.O.S.

N74-28319# Oulu Univ. (Finland). Arne Karjalainen Observatory.
A THEORETICAL PHOTOMETRIC FUNCTION OF SATURN'S RINGS
K. A. Haemeen-Anttila and P. Vaaraniemi 1974 17 p refs
(Rept-18) Avail: NTIS HC $4.00 CSCL 03B

A photometric theory of Saturn's rings is developed assuming that partially elastic collisions have brought all ring particles to the same plane. The resulting photometric function explains the tilt effect of the rings, but the opposition peak must originate in particles themselves. Author

N74-28320# Oulu Univ. (Finland). Aarne Karjalainen Observatory.
THE INFLUENCE OF RADIATION PRESSURE AND DRAG ON SATURN'S RINGS
Pentti Vaaraniemi 1974 19 p refs
(Rept-17) Avail: NTIS HC $4.00 CSCL 03B

The influence of radiation pressure and drag on the optical thickness of ring C is calculated as function of the saturnocentric distance. The results are compared with Franklin and Cook's (1958) data. It seems probable that drag causes more important effects than radiation pressure, at least in inner parts of ring C. The drag effect might also give an explanation to the Cassini division. Author

N74-28321*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COMET KOHOUTEK: A TEACHERS' GUIDE WITH STUDENT ACTIVITIES
Robert D. Champman Sep. 1973 45 p refs
(NASA-TM-X-70210) Avail: NTIS HC $5.25 CSCL 03A

Curriculum source material for teachers is provided on the comet Kohoutek. Also included are suggested projects for students. M.C.F.

N74-28247* California Univ., Livermore. Lawrence Livermore Lab.
ELECTRONS AT LOW ALTITUDES: A DIFFICULT BACKGROUND PROBLEM FOR SOFT X-RAY ASTRONOMY
F. D. Seward, R. J. Grader, A. Toor, G. A. Burginyon, and R. W. Hill *In* NASA. Goddard Space Flight Center Proc. of the Workshop on Electron contamination in X-ray Astronomy Expt. May 1974 25 p refs Sponsored by AEC (For availability see N74-28246 17-29)
(UCRL-51470) CSCL 03A

31 SPACE VEHICLES

Includes launch vehicles; manned space capsules; clustered and multistage rockets; satellites; sounding rockets and probes; and operating problems. For basic research see: 30 Space Sciences. For related information see also; 28 Propulsion Systems; and 32 Structural Mechanics.

N74-28322*# Allied Research Associates, Inc., Baltimore, Md.
THE NIMBUS 5 USER'S GUIDE
Romero R. Sabatini Nov. 1972 173 p refs
(Contract NAS5-21617)
(NASA-CR-139019) Avail: NTIS HC $11.75 CSCL 22B

Background information on the Nimbus 5 spacecraft and experiments is presented as a basis for selecting, obtaining, and utilizing the data in research studies. The basic spacecraft system operation and the objectives of the Nimbus 5 flight are outlined, followed by a detailed discussion of each of the experiments. The format, archiving, and access to the data, and the contents and format of the Nimbus 5 Data Catalogs are described. Author

N74-28323*# General Dynamics/Convair, San Diego, Calif.
DESIGN, MANUFACTURE, DEVELOPMENT, TEST, AND EVALUATION OF BORON/ALUMINUM STRUCTURAL COMPONENTS FOR SPACE SHUTTLE. VOLUME 3: SHEAR BEAM COMPONENT TEST AND ANALYSIS
E. E. Spier and M. F. Miller Feb. 1974 56 p refs
(Contract NAS8-27738)
(GDCA-DBG-73-006-Vol-3) Avail: NTIS HC $6.00 CSCL 22B

A boron/aluminum composite stiffened panel was designed, fabricated and tested. The panel represents a segment of a shear-resistant space shuttle thrust structure. The boron/aluminum design represents a 34% weight savings over an equivalent all-aluminum alloy design and a 42% weight savings over an equivalent all-titanium design. A finite element analysis of the panel was performed. The stiffened panel was extensively strain gaged. Correlation of strain-gage readings with the inelastic finite element analysis was made. Author

N74-28324*# TRW Systems, Cape Canaveral, Fla.
OPERATIONAL CONCEPTS FOR SELECTED SORTIE MISSIONS: EXECUTIVE SUMMARY Technical Report, Aug. 1973 - Jun. 1974
V. A. Dulock, Jr. Jun. 1974 36 p refs
(Contract NAS10-8395)
(NASA-CR-138753; TRW-24981-F006-R1-00) Avail: NTIS HC $5.00 CSCL 22B

An executive summary is presented of a Spacelab concept study conducted from August 1973 to June 1974. Background information and a summary of study conclusions are given. Specific data are reported for the quick-reaction carrier concept, software and mission integration, configuration management, documentation, equipment pool, and integration alternatives. A forecast of the impact of a second launch site, mission feasibility, and space availability for the Spacelab are also discussed. A.A.D.

N74-28325*# Aerospace Corp., El Segundo, Calif. Systems Planning Div.
PAYLOAD ANALYSIS FOR SPACE SHUTTLE APPLICATIONS (STUDY 2.2). VOLUME 3: PAYLOAD SYSTEM OPERATIONS ANALYSIS (TASK 2.2.1) Final Report
15 Oct. 1972 376 p refs
(Contract NASw-2301)
(NASA-CR-130367; ATR-73(7312)-1-Vol-3) Avail: NTIS HC $22.00 CSCL 22B

The technical and cost analysis that was performed for the payload system operations analysis is presented. The technical analysis consists of the operations for the payload/shuttle and payload/tug, and the spacecraft analysis which includes sortie, automated, and large observatory type payloads. The cost analysis includes the costing tradeoffs of the various payload design concepts and traffic models. The overall objectives of this effort were to identify payload design and operational concepts for the shuttle which will result in low cost design, and to examine the low cost design concepts to identify applicable design guidelines. The operations analysis examined several past and current NASA and DoD satellite programs to establish a shuttle operations model. From this model the analysis examined the payload/shuttle flow and determined facility concepts necessary for effective payload/shuttle ground operations. The study of the payload/tug operations was an examination of the various flight timelines for missions requiring the tug. Author

N74-28326*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
EVALUATION OF BERYLLIUM FOR SPACE SHUTTLE COMPONENTS Final Report
A. E. Trapp 30 Sep. 1972 542 p refs
(Contract NAS8-27739)
(NASA-CR-124009; LMSC-D159319) Avail: NTIS HC $30.25

CSCL 22B

Application of beryllium to specific full-scale space shuttle structural components and assemblies was studied. Material evaluations were conducted to check the mechanical properties of as-received material to gain design information on characteristics needed for the material in the space shuttle environment, and to obtain data needed for evaluating component and panel tests. Four beryllium structural assemblies were analyzed and designed. Selected components of these assemblies, representing areas of critical loading or design/process uncertainty, were designed and tested, and two panel assemblies were fabricated. Trends in cost and weight factors were determined by progressive estimation at key points of preliminary design, final design, and fabrication to aid in a cost/weight evaluation of the use of beryllium. Author

N74-28327*# Battelle Columbus Labs., Ohio.
SPACE SHUTTLE TRANSPORTATION SYSTEM TECHNIQUES FOR USER/USE DEVELOPMENT Final Report
Paul J. Gripshover 30 Jun. 1974 103 p
(Contract NAS8-30529)
(NASA-CR-120259) Avail: NTIS HC $8.25 CSCL 22B

The problem of obtaining new uses for the Shuttle Transportation System (STS) was treated in the same way marketing problems are handled by industrial organizations. Techniques used by industry to obtain new ideas and customers were evaluated and analyzed for their relevance to the STS. Marketing barrier-data were used to develop strategy which called for a middleman organization to assist NASA in achieving its objectives. The importance of prompt initiation of the recommended strategy was established. Author

N74-28328*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MSFC SKYLAB ORBITAL WORKSHOP, VOLUME 1
May 1974 564 p refs 5 Vol.
(NASA-TM-X-64813-Vol-1) Avail: NTIS HC $10.75 CSCL 22B

The technical aspects of the Skylab-Orbital Workshop are discussed. Original concepts, goals, design philosophy, hardware, and testing are reported. The final flight configuration, overall test program, and mission performance are analyzed. The systems which are examined are: (1) the structural system, (2) the meteoroid shield systems, and (3) the environmental/thermal control subsystem. Author

N74-28329*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MSFC SKYLAB ORBITAL WORKSHOP, VOLUME 2
May 1974 414 p refs 5 Vol.
(NASA-TM-X-64813-Vol-2) Avail: NTIS HC $8.50 CSCL 22B

The design and development of the Skylab Orbital Workshop are discussed. The subjects considered are: (1) thrust attitude control system, (2) solar array system, (3) electrical power distribution system, (4) communication and data acquisition system, (5) illumination system, and (6) caution and warning system. Author

N74-28330*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MSFC SKYLAB ORBITAL WORKSHOP, VOLUME 3
May 1974 669 p refs 5 Vol.
(NASA-TM-X-64813-Vol-3) Avail: NTIS HC $13.00 CSCL 22B

The waste management system for the Skylab Orbital Workshop is discussed. The general requirements of the system are presented. Illustrations of the components of the system are provided. Data concerning maximum expected performance capabilities are developed. The results of performance tests on the system components are reported. Emphasis is placed on the human factors engineering aspects of the system. Author

N74-28331*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MSFC SKYLAB ORBITAL WORKSHOP, VOLUME 4
May 1974 527 p 5 Vol.
(NASA-TM-X-64813-Vol-4) Avail: NTIS HC $10.25 CSCL 22B

The design and development of specific systems on the Skylab Orbital Laboratory are discussed. The subjects considered are: (1) pressure garment conditioning system, (2) stowage system, (3) ground support equipment systems, and (4) marking systems illustrations of the system components are provided. Results of performance tests are discussed. Author

N74-28332*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MSFC SKYLAB ORBITAL WORKSHOP, VOLUME 5
May 1974 450 p refs 5 Vol.
(NASA-TM-X-64813-Vol-5) Avail: NTIS HC $9.00 CSCL 22B

The various programs involved in the development of the Skylab Orbital Workshop are discussed. The subjects considered include the following: (1) reliability program, (2) system safety program, (3) testing program, (4) engineering program management, (5) mission operations support, and (6) aerospace applications. Author

N74-28333*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DEVELOPMENT AND CORRELATION: VIKING ORBITER ANALYTICAL DYNAMIC MODEL WITH MODAL TEST
B. K. Wada, J. A. Garba, and J. C. Chen 1 Jun. 1974 46 p
(Contract NAS7-100)
(NASA-CR-138728; JPL-TM-33-690) Avail: NTIS HC $5.50 CSCL 22B

The Viking Orbiter (VO) experience in the achievement of a mathematical model is described along with the following project activities: (1) the generation of the overall plan for load analysis, an analytical dynamic model, and development tests; (2) the performance of VO subsystem static and modal tests; and (3) the correlation of the VO system model analysis and test. Success is attributed to the coordination of analysis and test using substructure modal coupling techniques. A.A.D.

N74-28334*# Grumman Aerospace Corp., Bethpage, N.Y.
IMPLEMENTATION AND EXTENSION OF THE IMPULSE TRANSFER FUNCTION METHOD FOR FUTURE APPLICATION TO THE SPACE SHUTTLE PROJECT. VOLUME 1: ANALYSIS AND CORRELATION STUDIES Technical Report, Feb. 1972 - Mar. 1973
M. Mantus and H. Pardo Apr. 1973 116 p refs
(Contract NAS9-12333)
(NASA-CR-134324) Avail: NTIS HC $9.00 CSCL 22B

Computer programming, data processing, and a correlation study that employed data collected in the first phase test were used to demonstrate that standard test procedures and equipment could be used to collect a significant number of transfer functions from tests of the Lunar Module test article LTA-11. The testing consisted of suspending the vehicle from the apex fittings of the outrigger trusses through a set of air springs to simulate the free-free state. Impulsive loadings were delivered, one at a time, at each of the landing gear's attachment points, in three mutually perpendicular directions; thus a total of 36 impulses were applied to the vehicle. Time histories of each pulse were recorded on magnetic tape along with 40 channels of strain gage response and 28 channels of accelerometer response. Since an automated data processing system was not available, oscillograph playbacks were made of all 2400 time histories as a check on the validity of the data taken. In addition, one channel of instrumentation was processed to determine its response to a set of forcing functions from a prior LTA-11 drop test. This prediction was compared with drop test results as a first measure of accuracy. Author

N74-28335*# Grumman Aerospace Corp., Bethpage, N.Y.
IMPLEMENTATION AND EXTENSION OF THE IMPULSE TRANSFER FUNCTION METHOD FOR FUTURE APPLICATION TO THE SPACE SHUTTLE PROJECT. VOLUME 2: PROGRAM DESCRIPTION AND USER'S GUIDE
G. Patterson Apr. 1973 77 p
(Contract NAS9-12333)
(NASA-CR-134325) Avail: NTIS HC $7.00 CSCL 22B

The data processing procedures and the computer programs were developed to predict structural responses using the Impulse Transfer Function (ITF) method. There are three major steps in

the process: (1) analog-to-digital (A-D) conversion of the test data to produce Phase I digital tapes (2) processing of the Phase I digital tapes to extract ITF's and storing them in a permanent data bank, and (3) predicting structural responses to a set of applied loads. The analog to digital conversion is performed by a standard package which will be described later in terms of the contents of the resulting Phase I digital tape. Two separate computer programs have been developed to perform the digital processing. Author

N74-28336*# Chrysler Corp., New Orleans, La. Space Div.
RESULTS OF AN AERODYNAMIC FORCE AND MOMENT INVESTIGATION OF AN 0.015-SCALE CONFIGURATION 3 SPACE SHUTTLE ORBITER IN THE NASA/ARC 3.5-FOOT HYPERSONIC WIND TUNNEL (OA58)
T. J. Dziubala (Rockwell Intern., Downey, Calif.) and J. W. Cleary (NASA. Ames Res. Center) Apr. 1974 462 p
(Contract NAS9-13247)
(NASA-CR-134091; DMS-DR-2060) Avail: NTIS HC $26.25 CSCL 22B

The primary objective of the test was to obtain stability and control data for the basic configuration and an alternate configuration for the Space Shuttle Orbiter. Pitch runs were made with 0 deg of sideslip at Mach numbers of 5.3, 7.3 and 10.3. Six-component force data and fuselage base pressures were recorded for each run. Shadowgraph pictures were taken at selected points. Model 420 was used for the tests. Author

N74-28337*# Missouri Univ., Rolla. Dept. of Electrical Engineering.
NUTATION CONTROL DURING PRECESSION OF A SPIN-STABILIZED SPACECRAFT Final Report
Jun. 1974 46 p refs
(Grant NGR-26-003-069)
(NASA-CR-138801; CRL-74.4) Avail: NTIS HC $5.50 CSCL 22B

Precession maneuver control laws for single-spin spacecraft are investigated so that nutation is concurrently controlled. Analysis has led to the development of two types of control laws employing precession modulation for concurrent nutation control. Results were verified through digital simulation of a Synchronous Meteorological Satellite (SMS) configuration. An addition research effort was undertaken to investigate the cause and elimination of nutation anomalies in dual-spin spacecraft. A literature search was conducted and a dual-spin configuration was simulated to verify that nutational anomalies are not predicted by the existing nonlinear model. No conclusions were drawn as to the cause of the observed nutational anomalies in dual-spin spacecraft. Author

N74-28338*# Chrysler Corp., New Orleans, La. Space Div.
PHASE CHANGE PAINT TESTS ON ROCKWELL ORBITER/TANK AND ORBITER ALONE CONFIGURATIONS (OH3A/OH3B)
M. Quan (Rockwell Intern.) and C. Craig (Rockwell Intern.) Apr. 1974 1057 p refs
(Contract NAS9-13247)
(NASA-CR-134075; DMS-DR-2100) Avail: NTIS HC $56.00 CSCL 22B

Wind tunnel tests were conducted on scale models of the space shuttle orbiter and external tank. The tests were designed to determine the basic heating rate and interference effects on the orbiter-tank configuration and to analyze the effectiveness of the thermal protective system on the reentry vehicle. The phase change paint techniques were used to determine areodynamic heating rates. Oil flow and schlieren photographs were used for flow visualization. Author

N74-28339*# Lockheed Missiles and Space Co., Sunnyvale, Calif. Space Systems Div.
DEVELOPMENT AND DESIGN APPLICATION OF RIGIDIZED SURFACE INSULATION THERMAL PROTECTION SYSTEMS, VOLUME 1
30 Dec. 1972 226 p refs 2 Vol.
(Contract NAS9-12856)
(NASA-CR-134326; LMSC-D282673-Vol-1; MSC-07040-Vol-1) Avail: NTIS HC $14.50 CSCL 22B

Materials and design technology of the all-silica LI-900 rigid surface insulation (RSI) thermal protection system (TPS) concept for the shuttle spacecraft is presented. All results of contract development efforts are documented. Engineering design and analysis of RSI strain arrestor plate material selections, sizing, and weight studies are reported. A shuttle prototype test panel was designed, analyzed, fabricated, and delivered. Thermophysical and mechanical properties of LI-900 were experimentally established and reported. Environmental tests, including simulations of shuttle loads represented by thermal response, turbulent duct, convective cycling, and chemical tolerance tests are described and results reported. Descriptions of material test samples and panels fabricated for testing are included. Descriptions of analytical sizing and design procedures are presented in a manner formulated to allow competent engineering organizations to perform rational design studies. Results of parametric studies involving material and system variables are reported. Material performance and design data are also delineated. Author

N74-28340*# Lockheed Missiles and Space Co., Sunnyvale, Calif. Space Systems Div.
DEVELOPMENT AND DESIGN APPLICATION OF RIGIDIZED SURFACE INSULATION THERMAL PROTECTION SYSTEMS. VOLUME 2: APPENDIXES
30 Dec. 1972 164 p refs 2 Vol.
(Contract NAS9-12856)
(NASA-CR-134327; LMSC-D282673-Vol-2-App; MSC-07040-Vol-2) Avail: NTIS HC $11.25 CSCL 22B
For abstract, see N74-28339.

N74-28341*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A SUMMARY OF THE MECHANICAL DESIGN, TESTING AND PERFORMANCE OF THE IMP-H AND J ATTITUDE CONTROL SYSTEMS
James R. Metzger 19 Jul. 1974 193 p
(NASA-TM-X-70691; X-731-74-173) Avail: NTIS HC $12.75 CSCL 22B

The main aspects of the attitude control system used on both the IMP-H and J spacecraft are presented. The mechanical configuration is described. Information on all the specific components comprising the flight system is provided. The acceptance and qualification testing of both individual components and the installed system are summarized. Functional information regarding the operation and performance in relation to the orbiting spacecraft and its mission is included. Related topics which are discussed are: (1) safety requirements, (2) servicing procedures, (3) anomalous behavior, and (4) pyrotechnic devices. Author

N74-28342*# Chrysler Corp., New Orleans, La. Space Div.
AERODYNAMIC INVESTIGATIONS INTO VARIOUS LOW SPEED L/D IMPROVEMENT DEVICES ON THE 140A/B SPACE SHUTTLE ORBITER CONFIGURATION IN THE ROCKWELL INTERNATIONAL LOW SPEED WIND TUNNEL (OA86)
R. C. Mennell (Rockwell Intern., Los Angeles) May 1974 692 p
(Contract NAS9-13247)
(NASA-CR-134098; DMS-DR-2114) Avail: NTIS HC $37.75 CSCL 22B

Tests were conducted to investigate various base drag reduction techniques in an attempt to improve Orbiter lift-to-drag ratios and to calculate sting interference effects on the Orbiter aerodynamic characteristics. Test conditions and facilites, and model dimensional data are presented along with the data reduction guidelines and data set/run number collation used for the studies. Aerodynamic force and moment data and the results of stability and control tests are also given. A.A.D.

N74-28343*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH OBSERVATORY SATELLITE (EOS) DEFINITION PHASE REPORT, VOLUME 1
Aug. 1971 374 p refs
(NASA-TM-X-69910; X-401-72-332-Vol-1) Avail: NTIS HC $21.75 CSCL 22B

System definition studies were conducted of the Earth Observatory Satellite (EOS). The studies show that the concept of an Earth Observatory Satellite in a near-earth, sun-synchronous

orbit would make a unique contribution to the goals of a coordinated program for acquisition of data for environmental research with applications to earth resource inventory and management. The technical details for the proposed development of sensors, spacecraft, and a ground data processing system are presented. Author

N74-28344*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SYSTEM SAFETY CHECKLIST SKYLAB PROGRAM REPORT
Earl M. McNail 30 May 1974 75 p Prepared in cooperation with Martin Marietta Aerospace, Denver
(Contract NAS8-24000)
(NASA-TM-X-64850) Avail: NTIS HC $3.75 CSCL 13L

Design criteria statement applicable to a wide variety of flight systems, experiments and other payloads, associated ground support equipment and facility support systems are presented. The document reflects a composite of experience gained throughout the aerospace industry prior to Skylab and additional experience gained during the Skylab Program. It has been prepared to provide current and future program organizations with a broad source of safety-related design criteria and to suggest methods for systematic and progressive application of the criteria beginning with preliminary development of design requirements and specifications. Recognizing the users obligation to shape the checklist to his particular needs, a summary of the historical background, rationale, objectives, development and implementation approach, and benefits based on Skylab experience has been included. Author

N74-28345*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
REYNOLDS NUMBER EFFECTS ON HYPERSONIC CHARACTERISTICS OF A 0.010-SCALE MODEL OF THE 139-B SHUTTLE ORBITER
Peter T. Bernot Jun. 1974 44 p ref
(NASA-TM-X-71954) Avail: NTIS HC $3.25 CSCL 22B

Longitudinal and lateral-directional stability characteristics of the 139-B orbiter (model 32-0) were obtained in a continuous flow hypersonic tunnel at Mach 10.3. Tests were made at Reynolds numbers of 1.04 million and 2.17 million (based on body length) over an angle of attack range of 12 deg to 36 deg at sideslip angles of 0 deg and minus 5 deg. Data were obtained at three elevon/body flap settings. Author

N74-28346*# Kanner (Leo) Associates, Redwood City, Calif.
HISTORY OF THE STRATOSPHERIC ROCKET IN THE USSR
M. K. Tikhonravov and V. P. Zaytsev Washington NASA Jul. 1974 16 p refs Transl. into ENGLISH of the report "Kistorii Stratosfernoy Rakety v SSSR" USSR, 1974 15 p
(Contract NASw-2481)
(NASA-TT-F-15747) Avail: NTIS HC $4.00 CSCL 16E

The development is presented of the stratospheric rocket in the Soviet Union since 1933, when the first liquid fuel rockets were launched. The capabilities, engine design, and fuels are included. Author

N74-28347*# Kanner (Leo) Associates, Redwood City, Calif.
HISTORY OF THE DEVELOPMENT OF ROCKET TECHNOLOGY AND ASTRONAUTICS IN POLAND BEFORE 1949
Wladyslaw Geisler Washington NASA Jul. 1974 7 p refs Transl. into ENGLISH of the report "Die Geschichte der Entwicklung der Raketentechnik und Astronautik in Polen vor dem Jahre 1949" Poland, 1974 3 p
(Contract NASw-2481)
(NASA-TT-F-15744) Avail: NTIS HC $4.00 CSCL 16E

The history of rockets in Poland is reviewed from 1241 to 1949. Author

N74-28348*# Scientific Translation Service, Santa Barbara, Calif.
CONING MOTION, AUTOROTATION AND VORTEX SYSTEMS OF SLENDER MISSILES
M. Fiechter Washington NASA Jun. 1974 37 p refs Transl. into ENGLISH from Z. Flugwiss. (West Germany), no. 8, 1972 p 281-292
(Contract NASw-2483)
(NASA-TT-F-15705) Avail: NTIS HC $5.00 CSCL 16E

The coning motion of missiles for a slenderness between 15 and 20.5 was tested in the subsonic wind tunnel of the ISL at a speed of 34.2 m/sec and a Reynolds number of 110,000. The conical pendulum motion of the projectile was investigated, and it was found that the autorotation could be attributed to the shedding of body vortices. The coning motion could be prevented by disturbing the body boundary layer in an asymmetric way. Author

N74-28349*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
APOLLO EXPERIENCE REPORT: FOOD SYSTEMS
Malcolm C. Smith, Jr., Rita M. Rapp, Clayton S. Huber, Paul C. Rambaut, and Norman D. Heidelbaugh Washington Jul. 1974 76 p refs
(NASA-TN-D-7720) Avail: NTIS HC $4.00 CSCL 06H

Development, delivery, and use of food systems in support of the Apollo 7 to 14 missions are discussed. Changes in design criteria for this unique program as mission requirements varied are traced from the baseline system that was established before the completion of the Gemini Program. Problems and progress in subsystem management, material selection, food packaging, development of new food items, menu design, and food-consumption methods under zero-gravity conditions are described. The effectiveness of various approaches in meeting food system objectives of providing flight crews with safe, nutritious, easy to prepare, and highly acceptable foods is considered. Nutritional quality and adequacy in maintaining crew health are discussed in relation to the establishment of nutritional criteria for future missions. Technological advances that have resulted from the design of separate food systems for the command module, the lunar module, The Mobile Quarantine Facility, and the Lunar Receiving Laboratory are presented for application to future manned spacecraft and to unique populations in earthbound situations. Author

N74-28350*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE ATMOSPHERE EXPLORER POWER SUBSYSTEM
A. Obenschain, J. Bacher (RCA, Princeton, N. J.), and P. Callen (RCA, Princeton, N. J.) Jun. 1974 31 p refs
(NASA-TM-X-70693; X-711-74-193) Avail: NTIS HC $4.75 CSCL 22B

The design and operation of the power subsystem for the Atmospheric Explorer spacecraft are discussed. The additional functional redundancy which was added in several component areas to improve the overall subsystem reliability is analyzed. The battery charging technique has been modified to include third electrode overcharge control. The automatic removal of all battery charge is provided to correct abnormally high battery voltages. An undervoltage detector has been added which removes all nonessential spacecraft loads when the battery voltage falls below a given level. All automatic functions can be over-ridden by ground command. Author

N74-28351*# Airborne Instruments Lab., Deer Park, N.Y.
DESIGN ANALYSIS TRACKING AND DATA RELAY SATELLITE SIMULATION SYSTEM
Jan. 1974 154 p Prepared for APL
(Contracts NAS5-21653; N00017-72-C-4401; APL/JHU-372285)
(NASA-CR-139032) Avail: NTIS HC $10.75 CSCL 22B

The design and development of the equipment necessary to simulate the S-band multiple access link between user spacecraft, the Tracking and Data Relay Satellite, and a ground control terminal are discussed. The core of the S-band multiple access concept is the use of an Adaptive Ground Implemented Phased Array. The array contains thirty channels and provides the multiplexing and demultiplexing equipment required to demonstrate the ground implemented beam forming feature. The system provided will make it possible to demonstrate the performance of a desired user and ten interfering sources attempting to pass data through the multiple access system. Author

N74-28352# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE DEVELOPMENT OF A FIRE CONTROL SYSTEM FOR

OFF-BORESIGHT LAUNCH OF AIR-TO-AIR MISSILES M.S. Thesis
Robert D. Green and Gerald M. Bergeman Dec. 1973 125 p refs
(AD-777583; GA/GAM/EE/73A-1) Avail: NTIS CSCL 19/5

Aerial combat places extreme demands on aircraft, weapon, and pilot performance. The probability of success with present air-to-air missiles varies with a number of parameters, and the pilot's problem of correlating the changing variables and recognizing true firing opportunities in a maneuvering environment is complex. The report presents an attack concept using rear hemisphere pursuit strategies leading to off-boresight missile launch. A fire control system using parameters measurable from the attacking aircraft is developed with algorithms which predict the maximum allowable lag angle for missile success and provide an indication of maximum range. (Modified author abstract)
GRA

N74-28353# Naval Ordnance Lab., White Oak, Md.
INFLUENCE OF ROUGHNESS ON HEAT TRANSFER AND TRANSITION: ART PROGRAM DATA REPORT
R. E. Phinney and F. P. Baltakis Dec. 1974 25 p (UF32322505)
(AD-777384; NOLTR-73-231) Avail: NTIS CSCL 16/2

In order to assess the direct influence of surface roughness upon heat transfer and its indirect effect through the shift in transition location, a series of wind tunnel tests were carried out. A fixed body shape (with one exception) with varying roughness was tested at a series of tunnel conditions and the heat transfer measured by the thin wall calorimeter method. The wind tunnel conditions and the heat transfer distribution around the models are presented in tabular form. Author (GRA)

N74-28354# Army Missile Command, Redstone Arsenal, Ala. Ground Equipment and Materials Directorate.
STRESS CORROSION OF CHAPARRAL FIN RETAINERS
John H. Honeycutt 25 Jan. 1974 18 p
(AD-777790; RL-74-4) Avail: NTIS CSCL 16/4

An investigation of the stress-corrosion characteristics of two materials proposed for use as fin retainers for the CHAPARRAL missile system was made. The two materials were 17-7PH stainless steel and QQ-S-777 carbon spring steel. Retainers made from these two materials were mounted on a test fixture, which simulated the static loading conditions, and subjected to a salt fog environment per MIL-STD-151-B. It was concluded that the retainers manufactured from the spring steel (QQ-S-777) were superior to those manufactured from the 17-7PH stainless steel. Author (GRA)

32 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; thermal stress; impact phenomena; vibration; flutter; inflatable structures; and structural tests. For related information see also: 17 Materials, Metallic; and 18 Materials, Nonmetallic.

N74-28355 Cornell Univ., New York.
AN ELASTIC FINITE ELEMENT ANALYSIS OF THE BUCKLING OF ECCENTRICALLY STIFFENED PLATES AND SHELLS Ph.D. Thesis
A. Henry J. Hagedoorn 1973 202 p
Avail: Univ. Microfilms Order No. 74-10833

A doubly curved thin shell element is combined with a generally curved and twisted thin walled line element to provide a numerical method for the geometrically nonlinear (finite displacement/small strain) analysis of eccentrically stiffened plates and shells. Lien's fully compatible 48 degrees-of-freedom element is modified to include orthotropic material layers. This allows for the smeared out modeling of the eccentric integral stiffening assuming that the stiffener geometry is uniform and that the stiffener spacing is sufficiently small. A thin walled beam element is formulated fully compatible with the shell element along the common junction line. The accuracy of the algorithm is verified in a series of illustrative examples covering linear static analysis, buckling analysis and large deflection (finite displacement/small strain) analysis. Dissert. Abstr.

N74-28356 Cornell Univ., New York.
PLASTIC DEFORMATION PROCESSING AND COMPRESSIVE FAILURE MECHANISMS IN METAL COMPOSITES Ph.D. Thesis
Ming-Shong Chang 1973 110 p
Avail: Univ. Microfilms Order No. 74-13749

Frictional coefficients under metal working conditions were determined by using the compression testing of rings. By successively measuring the ring deformations, the frictional coefficient was calculated with the aid of a computer. Conditions of zero friction, sticking interface, and intermediate friction were achieved in the compression testings of rings under various surface conditions. Three analytical methods were employed to predict the consolidation pressure in pressing the fiber/matrix sandwich into a monolayer composite. They were the (1) slab model, i.e., uniform stress distribution along the plane perpendicular to the flow direction, (2) extrusion model, considering the matrix material as extruded into the space between fibers, (3) indentation model, fibers were considered as punches indented on matrix foils. Of the three models, compared with the experiments, the indentation model gave the best predition of the consolidation pressures. Dissert. Abstr.

N74-28357 Texas A&M Univ., College Station.
A TREATISE ON NONLINEAR FINITE ELEMENT ANALYSIS Ph.D. Thesis
Joe Richard Tillerson 1973 387 p
Avail: Univ. Microfilms Order No. 74-13112

The use of the finite element method of structural analysis in geometrically and materially nonlinear applications is described. The basic equations of continuum mechanics required for the use of this analysis procedure are documented and, in many instances, explicitly derived. The matrix displacement method of finite element analysis is considered, first of all, as applied using linear theory. The extension of this technique to nonlinear applications follows for both static and dynamic behavior. It is this emphasis on nonlinear phenomena which contains the primary contributions of this endeavor. Consistent presentations of the general equations of equilibrium are in each case, followed by specialization of these complex expressions to physically understandable problems. Extensive consideration is given the numerical procedures which may be employed to determine solutions to the structural equations of motion. Dissert. Abstr.

N74-28358 Brigham Young Univ., Provo, Utah.
DYNAMIC WIND ANALYSIS OF STACKS Ph.D. Thesis
Ramalingam Radhakrishnan 1974 145 p
Avail: Univ. Microfilms Order No. 74-13465

The construction of tall stacks along with the advent of light-weight, slender structures increased the importance of the problem of wind induced oscillations in stacks. These wind excited vibrations depend in a complex manner on a large number of aerodynamic and structural parameters. In study, the dynamic behavior of four typical stacks was studied in considerable detail using a computer program developed for that purpose. The computer program uses the finite element technique to calculate the stiffness of a stack and the mode superposition method to compute the dynamic response. The results of the across wind response of prismatic and tapered stacks are compared.
Dissert. Abstr.

N74-28359 Duke Univ., Durham, N.C.
LARGE ELASTIC DEFLECTION ANALYSIS OF ARBITRARILY LOADED THIN SHELLS OF REVOLUTION BY THE INCREMENTAL LOADING TECHNIQUE Ph.D. Thesis
Levon Minnetyan 1974 111 p
Avail: Univ. Microfilms Order No. 74-13490

A finite element matrix displacement method is applied to the nonlinear elastic analysis of shells of revolution subjected to arbitrary loads. The axisymmetric shell structure is idealized as a series of upright conical segments separating nodal circles. Asymmetric quantities such as loads, deflections, and stresses varying along the circumference at each node are expressed in a finite Fourier series expansion. Coefficients of the terms in the Fourier series expansions of displacements are regarded as

the generalized displacements in terms of which the analysis is carried out. The effects of all generalized displacements are summed to calculate physical displacements of a nodal circle. A computer program is presented which carries through these calculations. Numerical examples of a circular cylindrical shell under radial line load, an open spherical cap under symmetrical and asymmetrical axial loads and a circular cylindrical shell subjected to an eccentric, axial-symmetric line load are given.
Dissert. Abstr.

N74-28360 Lehigh Univ., Bethlehem, Pa.
A PENNY SHAPED CRACK IN AN INFINITE MATRIX REINFORCED BY INFINITE FIBERS Ph.D. Thesis
Thazhathu Veetil Narayanan 1974 173 p
Avail: Univ. Microfilms Order No. 74-11351

The problem of an elastic solid containing a penny-shaped crack reinforced by identical circular cylindrical elastic fibers of infinite length was analyzed. The case of a single fiber was first considered. The stress in the body away from the crack was a uniform tension in the direction of the fiber. A singular integral equation was obtained from the condition of perfect bond between the fiber and the matrix. The integral equation was solved numerically, and the reduction of the stress intensity factor around the periphery of the crack, due to the fiber and the stress concentration factor in the fiber, due to the presence of the crack, were found. The problem of two fibers of different elastic moduli and different diameters, unsymmetrically placed, were also considered. The effects of varying the geometrical parameters and physical properties on the stress intensity factor are presented numerically. Dissert. Abstr.

N74-28361 Waterloo Univ. (Ontario). Solid Mechanics Div.
THE COMPUTER PROGRAMME DAPS FOR THE DESIGN AND ANALYSIS OF PLASTIC STRUCTURES
S. R. Parimi, S. K. Ghosh, and M. Z. Cohn Jun. 1973 84 p (Rept-26) Avail: Issuing Activity

Linear programming formulations, in forms convenient for computer programming, are presented for the problems in the plastic theory of structures: analysis and design under proportional and shake-down loading by static and kinematic approaches. The computer programme DAPS is described in detail. The solution of a frame example is presented with sample inputs and outputs. Two more examples are included for additional reference. The relative merits of the static and kinematic approaches to the solution of each of the problems are discussed. Author

N74-28362*# Princeton Univ., N.J. Dept. of Aerospace and Mechanical Sciences.
FREE VIBRATIONS OF A PLATE WITH VARYING NUMBER OF SUPPORTS
J. Drake, C.-K. Kang, and E. H. Dowell Nov. 1973 47 p refs (Grant NGR-31-001-146)
(NASA-CR-138681; AMS-1133) Avail: NTIS HC $5.50 CSCL 20K

This experimental investigation tested the accuracy of an analysis which predicts the natural frequencies of vibration of a plate constrained by an arbitrary number of point supports along the edges, and also determined the number of such supports which approximates an infinite number. Author

N74-28363*# Kanner (Leo) Associates, Redwood City, Calif.
THE FOURTH NATIONAL CONFERENCE ON ACOUSTICS. VOLUME 1A: NOISE AND VIBRATION CONTROL
Washington NASA Jun. 1974 268 p refs Transl. into ENGLISH of A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 343 p
(Contract NASw-2481)
(NASA-TT-F-15375) Avail: NTIS HC $16.50 CSCL 13B

Industrial and technological applications of acoustic methods for noise and vibration control are elaborated. For individual titles, see N74-28364 through N74-28404.

N74-28364* Kanner (Leo) Associates, Redwood City, Calif. **c23**
SOME PROBLEMS OF MODERN ACOUSTICS
A. Stan *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 1-8 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 17-25 (For availability see N74-28363 17-32)
CSCL 20A

The multidisciplinary and interdisciplinary character of acoustics is considered and its scientific, technological, economical and social implications, as well as the role of acoustics in creating new machines and equipment and improving the quality of products are outlined. Research beyond audible frequencies, as well as to extremely high acoustic intensities, which requires the development of a nonlinear acoustics is elaborated. Author

N74-28365* Kanner (Leo) Associates, Redwood City, Calif.
STUDY OF VIBRATIONS PRODUCED BY A VIBRATING BEAM USED FOR VIBRATING CONCRETES
Ch. Silas, L. Brindeu, I. Grosanu, and T. Cioara *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 9-14 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 27-31 (For availability see N74-28363 17-32)
CSCL 13B

For compacting concretes in building, vibrating beams are used. The vibrations are generated by inertial vibrators, and the beam is normally displaced by the operator by means of a handle that is elastically fastened to the beam by means of rubber pads. Considered are vibrations transmitted to the operator, taking into account the beam's shock vibration motions. The steady state motion of a dynamic beam pattern is studied, and results of experimental tests with existing equipment are presented.
Author

N74-28366* Kanner (Leo) Associates, Redwood City, Calif.
A MATHEMATICAL MODEL FOR STORIED BUILDINGS SUBJECTED TO AUTOMATIC LOOM STRESSES
A. Stan and M. Munteanu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 15-21 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 35-40 (For availability see N74-28363 17-32)
CSCL 13B

Expressions are derived for the displacements of a many storied building subjected to the action of classical weaving looms located at different levels of the building. The building is regarded as a vertical fixed beam with a uniformly distributed mass as well as concentrated masses at each level. The calculation relations are obtained on the assumption of harmonic variation of the forces acting at each level as well as the assumption of narrow band stationary random excitatory forces. Author

N74-28367* Kanner (Leo) Associates, Redwood City, Calif.
INSULATION OF NONLINEAR AND RANDOM VIBRATIONS IN THE MINING INDUSTRY
Constantin Zeveleanu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 22-28 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 43-49 (For availability see N74-28363 17-32)
CSCL 08I

The insulation of nonlinear and random vibrations is considered for some ore preparing and sorting implements: rotary crushers, resonance screens, hammer mills, etc. The appearance of subharmonic vibrations is analyzed, and the conditions for their appearance are determined. A method is given for calculating the insulation of these vibrations by means of elastic elements made of rubber. The insulation of the random vibrations produced by Symons crushers is calculated by determining the transmissability and deformation of the insulation system for a narrow band random response. Author

N74-28368* Kanner (Leo) Associates, Redwood City, Calif.
RANDOM VIBRATIONS OF QUADRATIC DAMPING SYSTEMS
T. Sireteanu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 29-35 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May

1973 p 51-56 (For availability see N74-28363 17-32)
CSCL 20K

An oscillating system with quadratic damping subjected to white noise excitation is replaced by a nonlinear, statistically equivalent system for which the associated Fokker-Planck equation can be exactly solved. The mean square responses are calculated and the optimum damping coefficient is determined with respect to the minimum mean square acceleration criteria. An application of these results to the optimization of automobile suspension damping is given. Author

N74-28369* Kanner (Leo) Associates, Redwood City, Calif.
RANDOM VIBRATIONS OF LINEAR VISCOELASTIC BEAMS WITH LUMPED MASSES
Florea Dinca and Tudor Sireteanu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 36-42 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Compaterea Zgomotului Si Vibratiilor, Buckharest, 29-31 May 1973 p 59-64 (For availability see N74-28363 17-32)
CSCL 20K

A method is presented of determining the mean square transversal deflection of an isotropic and homogeneous linear viscoelastic beam having a certain number of lengthwise distributed lumped masses. It is assumed that the beam is acted upon by a stationary random process uniformly distributed along the beam. The method is useful in vibration level control by means of additional lumped masses. Author

N74-28370* Kanner (Leo) Associates, Redwood City, Calif.
THE RESPONSE OF MANY-STORIED STRUCTURES UNDER SEISMIC ACTIONS
Karius Munteanu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 43-49 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 67-73 (For availability see N74-28363 17-32)
CSCL 13B

A seismic action which is characterized by the acceleration function of the seismic motion is analyzed. The equations of motion in the direction of the seismic action are determined for a completely rigid ground and for a ground with linear deformability characteristics (rotation deformability). The equation for the rotation motion is derived by considering elastic and viscoelastic properties of the foundation ground. The differential equations are written by treating the mechanical model of a many-storied structure as a fixed vertical beam with a uniformly distributed mass as well as with concentrated masses on each floor.
Author

N74-28371* Kanner (Leo) Associates, Redwood City, Calif.
EXPERIMENTAL DETERMINATION OF THE VIBRATION LEVEL IN 5,100 kW ELECTRIC LOCOMOTIVE ASSEMBLIES
Elvira Criciotoiu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 50-54 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 75-79 (For availability see N74-28363 17-32)
CSCL 13F

Because of the high vibration level occurring during the running of electric locomotives, mechanical defects occur in the control mechanisms of auxiliary services. This fact has given rise to the necessity of determining the values of these vibrations in electric locomotives during their running. Measurements were conducted on the Craiova-Drobeta-Turnu Severin line, and measures to reduce the vibration level in electric locomotives were instituted. Author

N74-28372* Kanner (Leo) Associates, Redwood City, Calif.
CONTRIBUTIONS TO THE PROBLEM OF PIEZOELECTRIC ACCELEROMETER CALIBRATION c14
I. Jakab and A. Bordas *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 55-61 refs Transl. into ENGLISH from A 4-A Conferinta Nationalade Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 81-86 (For availability see N74-28363 17-32)
CSCL 14B

After discussing the principal calibration methods for piezoelectric accelerometers, an experimental setup for accelerometer calibration by the reciprocity method is described It is shown how the use of a lock-in voltmeter eliminates errors due to viscous damping and electrical loading. Author

N74-28373* Kanner (Leo) Associates, Redwood City, Calif.
VIBRATION AND NOISE MEASURING INSTRUMENTS BUILT IN THE RSR c14
Ioan Georgescu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 62-67 Transl. into ENGLISH from A 4-A. Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 89-95 (For availability see N74-28363 17-32)
CSCL 14B

The demands placed upon vibration and noise measuring instruments are discussed. The instruments that are now being manufactured in the RSR are described, as well as those that are being made ready for manufacture, namely: the VP-3 portable vibrometer, the N2103 precision electronic vibrometer, the N2103 B sonometric preamplifier, as well as vibration transducers of the electrodynamic and piezoelectric types. Author

N74-28374* Kanner (Leo) Associates, Redwood City, Calif.
PHOTOELECTRONIC VIBROMETER WITH POLARIZED LIGHT c14
I. Kremmer *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 68-72 refs Transl. into ENGLISH from A 4-A Conferintal Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulli Si Vibratiilor, Bucharest, 29-31 May 1973 p 97-101 (For availability see N74-28363 17-32)
CSCL 14B

A seismic torsiometer is described which is based on the reception by a photosensitive transducer of a light flux modulated by a relative rotation of the optical axes of two polaroids. The torsional vibrations of the polaroid fixed to the shaft are transmitted to the other polaroid (which at the same time is the seismic mass of the apparatus) by means of elastic lamellas. The device can work as accelerometer, vibrometer or frequency meter, depending on the value of the ratio between the proper oscillation frequency of the seismic system and the measured vibration frequency. Author

N74-28375* Kanner (Leo) Associates, Redwood City, Calif.
VIBRATION CONTROL IN FORGE HAMMERS
Florica Moise and Carmen Lazarescu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 73-78 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 103-108 (For availability see N74-28363 17-32)
CSCL 13I

Special measures are discussed for calculating, designing and executing a forge hammer foundation, so that the vibrations that occur during its working will not be transmitted to neighboring machinery, workrooms and offices. These vibrations are harmful to the workers near the forge hammer. Author

N74-28376* Kanner (Leo) Associates, Redwood City, Calif.
VIBRATION AND RECOIL CONTROL OF PNEUMATIC HAMMERS
I. N. Constantinescu and A. V. Darabont *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 79-84 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomatuli Si Vibratiilor, Bucharest, 29-31 May 1973 p 111-116 (For availability see N74-28363 17-32)
CSCL 13I

Vibration sources are described for pneumatic hammers used in the mining industry (pick hammers), in boiler shops (riveting hammers), etc., bringing to light the fact that the principal vibration source is the variation in air pressure inside the cylinder. The present state of the art of vibration control of pneumatic hammers as it is practiced abroad, and the solutions adopted for this purpose, are discussed. A new type of pneumatic hammer with a low noise and vibration level is presented. Author

N74-28377* Kanner (Leo) Associates, Redwood City, Calif.
OBSERVATIONS ON SOME ACOUSTIC METHODS USED IN STUDYING THE ELASTIC PROPERTIES OF METALS c17

Constantin Ioan Velceanu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 85-92 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 119-124 (For availability see N74-28363 17-32)
CSCL 11F

An experimental setup is reported that permits very accurate measurements of the resonance frequencies of long cylindrical beams fixed in the middle and whose size can vary within wide limits. It also permits measurement of the width of the resonance curve. It is shown that the Poisson effect can be brought to light for relatively long beams and for relatively short beams. Poisson ratio, values obtained with this method argue in favor of using the low frequency region for determining elastic constants of solids. Author

N74-28378* Kanner (Leo) Associates, Redwood City, Calif.
ACOUSTIC DETERMINATION OF CRACKS IN WELDED JOINTS c15

Macsimilian Baltanoiu and Elvira Criciotoiu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 93-97 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului i Vibratiilor, Bucharest, 29-31 May 1973 p 127-132 (For availability see N74-28363 17-32)
CSCL 13E

The acoustic analysis method permits detection of any cracks that might take place and their manner of propagation. The study deals with the cracks produced in experiments to determine the welding technology for a welded gray cast iron workpiece by using piezoelectric transducers to determine vibration acceleration. Author

N74-28379* Kanner (Leo) Associates, Redwood City, Calif.
CONSIDERATIONS ON THE ACOUSTIC ENERGY RADIATED BY TOOTHED GEARS c15

N. G. Popinceanu and I. Kremmer *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 98-103 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 135-140 (For availability see N74-28363 17-32)
CSCL 13I

A mechano-acoustic model is reported for calculating acoustic energy radiated by a working gear. According to this model, a gear is an acoustic coublet formed of the two wheels. The wheel teeth generate cylindrical acoustic waves while the front surfaces of the teeth behave like vibrating pistons. Theoretical results are checked experimentally and good agreement is obtained with open gears. The experiments show that the air noise effect is negligible as compared with the structural noise transmitted to the gear box. Author

N74-28380* Kanner (Leo) Associates, Redwood City, Calif.
PRELIMINARY STUDY OF GEAR NOISE CHARACTERISTICS c15

M. D. Gafitanu and R. H. Lyon *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 104-111 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului i Vibratiilor, Bucharest, 29-31 May 1973 p 143-148 (For availability see N74-28363 17-32)
CSCL 13I

Experimental results and conclusions are presented about the noise characteristics of gears as a function of their operating conditions. The interpretive possibilities offered by real time noise and vibration spectrum analysis are emphasized. The noise reducing effects of light weight insulation boxes are also discussed. Author

N74-28381* Kanner (Leo) Associates, Redwood City, Calif.
LOAD INFLUENCE ON GEAR NOISE c15

V. Merticaru *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 112-117 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Gzomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 151-156 (For availability see N74-28363 17-32)
CSCL 13I

An original mathematical model is proposed to derive equations for calculation of gear noise. These equations permit the acoustic pressure level to be determined as a function of load. Application of this method to three parallel gears is reported. The logical calculation scheme is given, as well as the results obtained. Author

N74-28382* Kanner (Leo) Associates, Redwood City, Calif.
CONTRIBUTIONS TO THE REDUCTION OF GEAR NOISE c15

I. Kremmer *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 118-123 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 159-164 (For availability see N74-28363 17-32)
CSCL 13I

The influence of profile displacements on the acoustic pressure level of running gears is studied. The conclusion is reached that extra polar gears function well, reducing the acoustic pressure level by about 2-3 db which, at the level of the total noise of 80-90 db, can be easily felt. This result can be explained by the fact that in this gear the pitch point is situated outside of the gearing segment, so that a certain change in the direction of the friction force between the tooth flanks is eliminated. Author

N74-28383* Kanner (Leo) Associates, Redwood City, Calif.
ASPECTS OF REDUCING SPUR GEAR NOISE c15

Horia Giurgiuman, Mircea Cretu, and Ion Moraru *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 124-130 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 167-173 (For availability see N74-28363 17-32)
CSCL 13I

Noise sources in gears and ways of improving their silence by profile shape alterations and wheel surface smoothness are discussed. Practical results obtained, from the noise point of view are reported, for textile machinery. Author

N74-28384* Kanner (Leo) Associates, Redwood City, Calif.
CONTRIBUTIONS TO THE STUDY OF THE CHARACTERISTICS OF BEARING NOISE AND VIBRATIONS c15

M. D. Gafitanu, N. G. Popinceanu, D. Radauceanu, and I. Oancea *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 131-135 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 175-179 (For availability see N74-28363 17-32)
CSCL 13I

Results of experimental research on the noise and vibrations of radial ball and roller bearings are reported. Analysis of the frequency spectra disclosed dependences among vibration and noise, load, rpm and cage material. Some peculiar aspects of the frequency spectrum are also mentioned. Author

N74-28385* Kanner (Leo) Associates, Redwood City, Calif.
DATA ON THE NOISE VIBRATIONS OF MODERN TRACTION LOCOMOTIVES c23

Vasile Paslaru, Andrei Popescu, and R. Vrasti *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 136-142 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 181-186 (For availability see N74-28363 17-32)
CSCL 11F

A survey is presented of data on noise and vibration sources in modern locomotives and their influence on engine drivers. An attempt is made hierarchize noise and vibration sources in terms of importance and to correlate the noise level with the influence of noise on the engine drivers' organ of hearing. Some possible recommendations are outlined for reducing the level of

these noxae in order to improve the acoustic comfort of engine drivers. Author

N74-28386* Kanner (Leo) Associates, Redwood City, Calif.
THE COANDA EFFECT IN GAS-DYNAMIC NOISE CONTROL **c12**
Grigore Vasilescu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 143-149 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 189-197 (For availability see N74-28363 17-32)
CSCL 20D

The principle types of silencers are discussed for gas dynamic noise of free steam and gas expansions, as well as the results of research in gas dynamics of jets and applied acoustics. Gas dynamic noise attenuation by means of the Coanda effect is due to fluid decompression in a Coanda ejector of the external type, where a structural change takes place in the acoustic frequency spectrum and in its direction, as well as a substantial decrease in the fluid's velocity, temperature and concentration. This process is continued in the second phase with absorption of the acoustic waves by means of an active structure. Author

N74-28387* Kanner (Leo) Associates, Redwood City, Calif.
CALCULATION METHOD FOR ACTIVE SILENCERS WITH A VARIABLE SECTION **c23**
Vergiliu Marinescu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 150-155 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 199-203 (For availability see N74-28363 17-32)
CSCL 20A

By introducing variable section silencers in divergent and convergent sections or elbows of ventilation plants, the length of classical silencers can be reduced. Presented is an original calculation method for active noise silencers with a continuously variable section, as well as calculation relations worked out by this method for eight common practical cases. Author

N74-28388* Kanner (Leo) Associates, Redwood City, Calif.
REDUCTION OF DIESEL ENGINE EXHAUST NOISE IN THE PETROLEUM MINING INDUSTRY **c28**
Tatiana Marinov *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 156-162 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 205-211 (For availability see N74-28363 17-32)
CSCL 21A

An important noise source in a drilling plant is Diesel engine exhaust. In order to reduce this noise, a reactive silencer of the derivative resonator type was proposed, calculated from the acoustic and design point of view and applied. As a result of applying such a silencer on the exhaust conduit of a Diesel engine the noise level dropped down to 18 db. Author

N74-28389* Kanner (Leo) Associates, Redwood City, Calif.
THE PROBLEM OF NOISE IN WEAVING MILLS **c23**
T. Georgescu, E. Harastaseanu, and F. Mercea *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 163-169 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 213-219 (For availability see N74-28363 17-32)
CSCL 20A

In weaving mill departments equipped with shuttle looms there exists a high noise level that has a noxious effect on the human organism, a fact which affects a very great number of employees and has negative repercussions on productivity. Measurements were conducted in different weaving mills to determine the noise level as well as the influence of some factors that depend on the type of construction, the type, number and manner of operation of the looms, etc. Solutions for noise reduction were established that were applied experimentally in some weaving mills, and the results obtained are discussed. Author

N74-28390* Kanner (Leo) Associates, Redwood City, Calif.
LEVEL, PECULIARITIES AND EFFECTS OF COAL MINE NOISE ON PIT WORKERS **c05**
I. G. Darlea, P. Bitir, and M. Coculescu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 170-176 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 221-228 (For availability see N74-28363 17-32)
CSCL 05E

There exists a correlation between noise intensity and spectrum and degree of hearing impairment in the different professional categories in the pit. Most affected are dross miners and drillers. In these, the first degree of hypoacusia sets in within the first five years of exposure. Deafness begins at a frequency of 4,000 Hz, but often enough (20%) at 2,000 Hz as well, progressively evolving through the classical stages if exposure to noise continues. In the coal bearing basins investigated, the noise level is, on the whole, 31.2%, but the conventional zone is not involved by more than 6.3%. Technological and medical measures are proposed for the purpose of avoiding these troubles in the future. Author

N74-28391* Kanner (Leo) Associates, Redwood City, Calif.
NOISE CONTROL OF PNEUMATIC PERCUSSION DRILLS **c15**
A. Darabont and St. Soiman *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 177-181 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 231-238 (For availability see N74-28363 17-32)
CSCL 13I

Noise sources in pneumatic drills are studied bringing to light the fact that air exhaust is the most important source. The present state of the art of noise control is discussed for pneumatic percussion drills abroad, indicating the different solutions adopted in this respect. Drills produced in Rumania are described and the results of noise measurements are shown. Author

N74-28392* Kanner (Leo) Associates, Redwood City, Calif.
MEASURES FOR THE REDUCTION OF THE NOISE AND VIBRATION LEVEL OF APARTMENT HOUSE ELEVATORS **c23**
N. Enescu, M. Munteanu, and A. Stan *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 182-186 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 239-243 (For availability see N74-28363 17-32)
CSCL 20A

The reduction of the level of elevator noise and vibrations in apartment buildings was studied. By improving the mounting and gearing conditions of the winch and soundproofing the winch chamber, as well as by covering the elevator's control panel, the noise and vibration level was appreciably reduced. Author

N74-28393* Kanner (Leo) Associates, Redwood City, Calif.
REDUCTION OF NOISE GENERATED BY AIR CONDITIONING AND VENTILATION PLANTS AND TRANSMITTED TO INHABITED AREAS **c23**
E. Harastaseanu, G. Cristescu, and F. Mercea *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 187-197 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 245-258 (For availability see N74-28363 17-32)
CSCL 20A

The fans with which the conditioning and ventilation plants of weaving and spinning mills are equipped and the conditioning devices used in certain confection and knit wear departments of the textile industry generate loud noise. Solutions are presented for reducing the noise generated by the fans of ventilation and conditioning plants and transmitted to inhabited regions down to the admissible level, as well as the results obtained by experimental application of some noise reduction solutions in the conditioning plants of a spinning mill. Author

N74-28394* Kanner (Leo) Associates, Redwood City, Calif.
CHARTING ENVIRONMENTAL POLLUTION **c13**

Erich Halpert, Flavis Bizo, and Zoltan Karacsonyi *In its* The 4th Natl. Conf. on Acoustics Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 192-197 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 253-258 (For availability see N74-28363 17-32)

It is found that areas affected by different noxious agents are within the limits traced for high noise level areas; consequently, it is suggested that high noise pressure levels should be used as the primary indication of environmental pollution. A complex methodology is reported for charting environmental pollution due to physical chemical and biological noxious agents on the scale of an industrial district. Author

N74-28395* Kanner (Leo) Associates, Redwood City, Calif.
AN OBJECTIVE METHOD AND MEASURING EQUIPMENT FOR NOISE CONTROL AND ACOUSTIC DIAGNOSTICS OF MOTORCARS **c14**

J. Kacprowski, J. Motylewski, and J. Miazga *In its* The 4th Natl. Conf. on Acoustics Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 198-204 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 261-268 (For availability see N74-28363 17-32)

CSCL 14B

An objective method and apparatus for noise control and acoustic diagnostics of motorcar engines are reported. The method and apparatus let us know whether the noisiness of the vehicle under test exceeds the admissible threshold levels given by appropriate standards and if so what is the main source of the excessive noise. The method consists in measuring both the overall noise level and the sound pressure levels in definite frequency bands while the engine speed is controlled as well and may be fixed at prescribed values. Whenever the individually adjusted threshold level has been exceeded in any frequency band, a self-sustaining control signal is sent. Author

N74-28396* Kanner (Leo) Associates, Redwood City, Calif.
CONCERNS OF THE INSTITUTE OF TRANSPORT STUDY AND RESEARCH FOR REDUCING THE SOUND LEVEL INSIDE COMPLETELY REPAIRED BUSES **c11**

Alex. Groza, Jh. Calciu, I. Nicola, and Angela Ionasek *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 205-211 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotului Si Vibratiilor, Bucharest, 29-31 May 1973 p 269-274 (For availability see N74-28363 17-32)

CSCL 13F

Sound level measurements on noise sources on buses are used to observe the effects of attenuating acoustic pressure levels inside the bus by sound-proofing during complete repair. A spectral analysis of the sound level as a function of motor speed, bus speed along the road, and the category of the road is reported. Author

N74-28397* Kanner (Leo) Associates, Redwood City, Calif.
SOME ASPECTS OF SOUND DISCOMFORT CAUSED BY STREETCAR TRAFFIC **c05**

C. Ursoniu, N. Puca, A. Dankner, G. Moise, and A. Sirbu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 212-217 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 277-282 (For availability see N74-28363 17-32)

CSCL 05E

Streetcar noise was investigated on different lines and inside different types by sonometer measurements. The results showed variations of the total noise intensity between 88-97 db. In some squares with heavy traffic the total noise intensity reached 106 db. Noise intensity measurements inside different types of streetcars brought to light high values between 101-106 db, while in the case of the new silent type of streetcar the values were 86-87 db. The importance of the sound discomfort produced by streetcar traffic is emphasized, inasmuch as the noise intensity exceeds by far the values recommended by communal hygiene. Author

N74-28398* Kanner (Leo) Associates, Redwood City, Calif.
DATA ON THE ACOUSTIC COMFORT OF PASSENGERS IN RAILROAD CARS AND SOUNDPROOFING RECOMMENDATIONS **c05**

Constantin Tomescu and Radu Vrasti *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 218-223 Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 285-291 (For availability see N74-28363 17-32)

CSCL 05E

Acoustic passenger comfort in railroad cars is represented by the following values: Total noise level in db, octave sound spectrum in db, and indices of intelligibility. The noise level perceived inside the car results from two components: one due to the penetration of air noise, and another due to the transmission of vibrations through solids. Measurement results show the necessity of improving bogie and bogie-body connections, intensification of soundproofing of the floor, adaption of windows with double panes, etc. Author

N74-28399* Kanner (Leo) Associates, Redwood City, Calif.
USE OF CONVENTIONAL EQUIPMENT TO MEASURE THE EFFECTIVE PERCEIVED NOISE LEVEL OF AIRCRAFT **c14**

Nicholas Plom *In its* the 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 224-232 ref Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 293-298 (For availability see N74-28363 17-32)

CSCL 14B

A real time, computerized, measurement method for the effective perceived noise level is reported that uses comparison of two sounds differing in level and frequency to obtain the noise intensity emitted by aircraft and to calculate human psychoacoustic annoyance reactions. G.G.

N74-28400* Kanner (Leo) Associates, Redwood City, Calif.
AIRCRAFT NOISE IN THE REGION OF THE BUCHAREST-OTOPENI AIRPORT **c02**

M. Costescu, C. Gherghel, and A. Curtoglu *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 233-237 ref Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 301-305 (For availability see N74-28363 17-32)

CSCL 20A

Aircraft noise, especially in the region adjoining airports, constitutes a problem that will be aggravated in the near future because of increasing aircraft traffic and the appearance of new types of large tonnage aircraft with continuously increasing powers and speeds. Criteria for the evaluation of aircraft noise are reported and some results of studies carried out in the region of Bucharest-Otopeni Airport are detailed. Author

N74-28401* Kanner (Leo) Associates, Redwood City, Calif.
ACOUSTIC WAVE TRANSMISSION THROUGH MULTI-LAYER **c23**

C. Salceanu and V. Bacria *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 238-245 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 307-312 (For availability see N74-28363 17-32)

CSCL 20A

Acoustic wave transmission through several media extended to infinity is studied by analyzing the factors influencing transmission, and by determining the conditions under which acoustic energy is transmitted integrally Author

N74-28402* Kanner (Leo) Associates, Redwood City, Calif.
NOISE AND VIBRATION LEVEL REDUCTION BY COVERING METAL STRUCTURES WITH LAYERS OF DAMPING MATERIALS

I. Rugina and H. T. O. Paven *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 246-253 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor,

Bucharest, 29-31 May 1973 p 315-323 (For availability see N74-28363 17-32)
CSCL 13B

One of the most important methods of reducing the noise and vibration level is the damping of the secondary sources, such as metal plates, often used in vehicle structures, by means of covering materials with high internal viscosity. Damping layers are chosen at an optimum thickness corresponding to the frequency and temperature range in which a certain structure works. The structure's response corresponding to various real situations is analyzed by means of a measuring chain including electroacoustical or electromechanical transducers. The experimental results provide the dependence of the loss factor and damping transmission coefficient as a function of the damping layer thickness or of the frequency for various viscoelastic covering materials. Author

N74-28403* Kanner (Leo) Associates, Redwood City, Calif.
DIFFERENTIAL PHONOGRAMS **c23**
Erich Halpert and Nicolas Beuran *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 254-258 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 325-329 (For availability see N74-28363 17-32)
CSCL 20A

A new noise measuring method is outlined that is based on electronic analysis of the radiated noise. Non-relevant components are suppressed, while the differential phonogram displayed on the oscilloscope screen discloses the information carrying components. It allows low skilled operators to perform: (1) correct alignment of equipment; (2) detection of incipient failure; and (3) checking of prototypes. Author

N74-28404* Kanner (Leo) Associates, Redwood City, Calif.
PRESENT TENDENCIES IN EQUIPMENT NOISE NORMALIZATION **c23**
Anna Sternberg *In its* The 4th Natl. Conf. on Acoustics, Vol. 1A (NASA-TT-F-15375) Jun. 1974 p 259-265 refs Transl. into ENGLISH from A 4-A Conferinta Nationala de Acustica. Vol. 1,A. Combaterea Zgomotulu Si Vibratiilor, Bucharest, 29-31 May 1973 p 331-338 (For availability see N74-28363 17-32)
CSCL 20A

The importance of equipment noise normalization in the complex of measures aimed at reducing noise in work spaces, as well as the necessity of correlating these norms with the criteria that establish the noxious values of noise for man are outlined. Author

N74-28405# Royal Aircraft Establishment, Farnborough (England).
AN ORTHOGONALITY METHOD FOR THE DETERMINATION OF THE DYNAMIC PARAMETERS OF AN ELASTIC BODY FROM ITS GROUND RESONANCE TEST
H. Wittmeyer Oct. 1973 27 p refs Transl. into ENGLISH from Ing.-Arch. (West Germany), V. 42, No. 2, 1973 p 104-115
(RAE-Lib-Trans-1731; BR38936) Avail: NTIS HC $4.50

The natural modes and the associated generalized masses, damping coefficients and natural frequencies of a linear elastic structure with small damping are derived from values measured during a ground resonance test (shake test) of this structure. No frequency coincidences and only small damping couplings between the natural mode are allowed. The method is not as sensitive to the choice of location of the shakers as similar simple methods are. The method is derived by using the orthogonality relations of the natural modes of the undamped structure. Author

N74-28406# Duke Univ., Durham, N.C. Dept. of Civil Engineering.
DYNAMIC STABILITY AND STRESS ANALYSIS OF ALTERNATIVE GUIDEWAYS FOR LEVITATION VEHICLES
James F. Wilson Dec. 1973 241 p refs
(Contract DOT-FR-30029)
(FRA-ORD/D-74-49) Avail: NTIS HC $15.25 CSCL 20K

Responses are predicted for several kinds of guideways subjected to the constant, transit pressures of levitation-type vehicles. The studies include: (1) stresses in subterranean tunnel liners with alternative vehicle support structures; (2) comparative dynamic efficiencies of simple and two-span elevated guideways with several distributions of transit loads; (3) dynamics of multiple, flexible post and rigid panel guidance walls; (4) dynamics of segmented (open-jointed) guidance plates and of continuous plate strips with arbitrary joundation restraints; (5) responses to transit moments of plate-type levitation surfaces on elastic foundations; and (6) applications of these dynamic theories in determining stresses for alternative at-grade guideways of current importance. The dynamic deflections and moments in the plate-type guidance and levitation surfaces are presented in a general form, in terms of dimensionless system parameters which cover the ranges of practical interest. Author

N74-28407*# Stanford Univ., Calif.
ROTATION IN VIBRATION, OPTIMIZATION, AND AEROELASTIC STABILITY PROBLEMS Ph.D. Thesis
Krishna Rao Venkata Kaza May 1974 192 p refs
(Grant NGL-05-020-243)
(NASA-CR-138805) Avail: NTIS HC $12.75 CSCL 20K

The effects of rotation in the areas of vibrations, dynamic stability, optimization, and aeroelasticity were studied. The governing equations of motion for the study of vibration and dynamic stability of a rapidly rotating deformable body were developed starting from the nonlinear theory of elasticity. Some common features such as the limitations of the classical theory of elasticity, the choice of axis system, the property of self-adjointness, the phenomenon of frequency splitting, shortcomings of stability methods as applied to gyroscopic systems, and the effect of internal and external damping on stability in gyroscopic systems are identified and discussed, and are then applied to three specific problems. Author

N74-28408*# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.
DEPLOYMENT AND PERFORMANCE CHARACTERISTICS OF 1.5-METER SUPERSONIC ATTACHED INFLATABLE DECELERATORS
Herman L. Bohon, James Wayne Sawyer, and Robert Miserentino Washington Jul. 1974 42 p refs
(NASA-TN-D-7550; L-9402) Avail: NTIS HC $3.25 CSCL 01B

Attached-inflatable-decelerator (AID) canopies fabricated from lightweight Nomex cloth and tapes were deployed in a supersonic stream from the base of a 140 deg conical aeroshell. Characteristics of the deceleration system were obtained over a wide range of Mach number, dynamic pressure, and pitch angle. All models deployed rapidly by ram air and experienced only mild deployment shock loads. Steady-state drag coefficients as high as 1.3 were obtained in the supersonic stream and were relatively insensitive to Mach number, dynamic pressure, and pitch angle. All models were free of fluttering motion. Results also showed that the AID is aerodynamically more efficient without a burble fence in a supersonic stream. Though measured meridian-tape loads were higher than those predicted by theory, the ram-air deployment rates and steady-state drag coefficients were in good agreement with theory. These results indicate that the AID is a stable, efficient decelerator in a supersonic stream and its performance is readily predictable. Author

N74-28409*# Brown Univ., Providence, R.I. Div. of Engineering.
ON NUMERICALLY ACCURATE FINITE ELEMENT
J. C. Nagtegaal, D. M. Parks, and J. R. Rice Mar. 1974 49 p refs
(Grant NGL-40-002-080)
(NASA-CR-138821) Avail: NTIS HC $5.50 CSCL 20K

A general criterion for testing a mesh with topologically similar repeat units is given, and the analysis shows that only a few conventional element types and arrangements are, or can be made suitable for computations in the fully plastic range. Further, a new variational principle, which can easily and simply be incorporated into an existing finite element program, is presented. This allows accurate computations to be made even for element designs that would not normally be suitable. Numerical results are given for three plane strain problems, namely pure bending of a beam, a thick-walled tube under pressure, and a

deep double edge cracked tensile specimen. The effects of various element designs and of the new variational procedure are illustrated. Elastic-plastic computation at finite strain are discussed. Author

N74-28410*# Brown Univ., Providence, R.I. Div. of Engineering.
FINITE ELEMENT FORMULATIONS FOR PROBLEMS OF LARGE ELASTIC-PLASTIC DEFORMATION
R. M. McMeeking and J. R. Rice May 1974 32 p refs
(Grant NGL-40-002-080)
(NASA-CR-138820) Avail: NTIS HC $4.75 CSCL 20K

An Eulerian finite element formulation is presented for problems of large elastic-plastic flow. The method is based on Hill's variational principle for incremental deformations, and is suited to isotropically hardening Prandtl-Reuss materials. The formulation is given in a manner which allows any conventional finite element program, for 'small strain' elasticplastic analysis, to be simply and rigorously adapted to problems involving arbitrary amounts of deformation and arbitrary levels of stress in comparison to plastic deformation moduli. The method is applied to a necking bifurcation analysis of a bar in plane-strain tension. A unified general formulation of finite element equations, both Lagrangian and Eulerian, for large deformations, with arbitrary choice of the conjugate stress and strain measures, and a discussion is given of other proposed formulations for elastic-plastic finite element analysis at large strain. Author

N74-28411*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ATTITUDE DYNAMICS SIMULATION SUBROUTINES FOR SYSTEMS OF HINGE-CONNECTED RIGID BODIES
G. E. Fleischer and P. W. Likins 1 May 1974 140 p refs
(Contract NAS7-100)
(NASA-CR-138819; JPL-TR-32-1592) Avail: NTIS HC $4.75 CSCL 20K

Several computer subroutines are designed to provide the solution to minimum-dimension sets of discrete-coordinate equations of motion for systems consisting of an arbitrary number of hinge-connected rigid bodies assembled in a tree topology. In particular, these routines may be applied to: (1) the case of completely unrestricted hinge rotations, (2) the totally linearized case (all system rotations are small), and (3) the mixed, or partially linearized, case. The use of the programs in each case is demonstrated using a five-body spacecraft and attitude control system configuration. The ability of the subroutines to accommodate prescribed motions of system bodies is also demonstrated. Complete listings and user instructions are included for these routines (written in FORTRAN V) which are intended as multi- and general-purpose tools in the simulation of spacecraft and other complex electromechanical systems. Author

N74-28412# Royal Aircraft Establishment, Farnborough (England).
DETERMINATION OF THE NATURAL MODES OF A STRUCTURE FROM A VIBRATION TEST WITH ARBITRARY EXCITATION
Rolland Dat Jan. 1974 24 p ref Transl. into ENGLISH from La Recherche Aerospatiale (France), v. 2, 1973 p 99-108
(RAE-Lib-Trans-1741; BR39608) Avail: NTIS HC $4.25

The reduction into simple elements of the transfer functions of a linear discrete lightly damped system is expressed as function of the modal characteristics of the associated conservative system, and of the coefficients of the generalized damping matrix. These simple elements are determined independently from the response of the system to sinusoidal excitation, following a smoothing method. A method is presented which enable the modal characteristics of a structure to be determined from the results of a vibration test in which arbitrary excitation is applied. Author

N74-28413# State Univ. of New York, Stony Brook. Dept. of Materials Science.
APPLICATIONS OF MICRODYNAMICS AND LATTICE MECHANICS TO PROBLEMS IN PLASTIC PLOW AND FRACTURE Progress Report, 1 Jan. - 31 Dec. 1973
J. C. Bilello 1973 19 p refs
(Contract AT(11-1)-3476)
(COO-3476-7) Avail: NTIS HC $3.00

Dislocation motion in the initial stages of plastic flow for asgrown and ultrahigh-vacuum-outgassed tungsten single crystals was studied by a low-frequency microstrain technique over the temperature range from 4.2 to 300 K. In terms of the observed elastic limit, anelastic limit, and the fractional energy dissipation, the effects of purity, temperature, and stress amplitude on the frictional stress for dislocation motion are discussed. In the high-frequency regime, ultrasonic attenuation measurements in copper and copper-nickel alloys reveal a linear dependence of the velocity-dependent damping coefficient on the dislocation density. Effects of alloying are most pronounced for the early stages of alloy addition. In copper crystals constrained by the presence of an inherent polycrystalline layer, the barrier to dislocation motion at the surface enhances secondary slip in the bulk of the material, thereby producing a significant strengthening effect. Author (NSA)

N74-28414# California Univ., Berkeley. Earthquake Engineering Research Center.
CYCLIC PLASTIC ANALYSIS OF STRUCTURAL STEEL JOINTS
R. Bruce Pinkney Aug. 1973 172 p refs
(PB-226843/1; EERC-73-15) Avail: NTIS HC $5.00 CSCL 13M

Severe lateral loading of an unbraced building frame, due to high winds or earthquake, can induce cyclic inelastic stress reversal in its component parts, particularly the joints between beams and columns. Accurate frame analysis thus requires a knowledge of joint between beams and columns. Accurate frame analysis thus requires a knowledge of joint behavior beyond the the elastic range. The purpose of the study was to investigate a method of analytically predicting the cyclic inelastic response of a structural steel joint. (Modified author abstract) GRA

N74-28415# Naval Ship Research and Development Center, Bethesda, Md.
OPTIMIZATION TECHNIQUES FOR MULTIDEGREES OF FREEDOM VIBRATION ISOLATION SYSTEMS
Christopher Ng Feb. 1974 60 p refs
(AD-777412; NSRDC-4260) Avail: NTIS CSCL 20/11

To date, the optimization of vibration isolation systems has been limited to models with one and two degrees of freedom. This study extends the techniques to the optimization of multidegree-of-freedom systems having translational and rotational modes. The purpose was attainment of a min-max point (saddle point) to enable the objective function of the system to be maximized with respect to a single state variable, the frequency, at the same time that it is minimized with respect to multicontrol variables, the damping constants. (Modified author abstract) GRA

N74-28416# Aerospace Corp., El Segundo, Calif. Lab. Operations.
USE OF FINITE ELEMENT ANALYSIS IN FRACTURE MECHANICS
Charles E. Atchley and Louis Raymond 5 Apr. 1974 69 p refs
(Contract F04701-73-C-0074)
(AD-778098; TR-0074; SAMSO-TR-74-89) Avail: NTIS CSCL 20/11

Many problems in fracture mechanics are not readily amenable to analytical treatment. Stress distributions and stress intensity factors cannot always be calculated easily for a given structural geometry and loading condition. However, finite element methods offer an accurate, versatile, and conceptually simple means by which a given structure can be analyzed. They allow a general application of classical crack propagation analysis whereby the necessary estimates of the stress intensity factor may be calculated. The report presents the development of a general finite element method commonly used in structural mechanics and several finite element approaches employed specifically in fracture mechanics for computing stress and displacement functions, and stress intensity factors for a cracked structure. (Modified author abstract) GRA

N74-28417# Catholic Univ. of America, Washington, D.C. Stress Analysis Lab.
EVALUATION OF LARGE STRAINS IN INDUSTRIAL

APPLICATIONS
J. Wolak and V. J. Parks Apr. 1974 31 p refs
(Contract N00014-67-A-0377-0011)
(AD-778031) Avail: NTIS CSCL 13/8

For the case of a two-dimensional strain field the usual concepts of direct and of shear strains are developed in terms of the principal strains and of the orientations of the elements in question. These expressions are used to form a Mohr's circle, which permits the transformation of strain from one axis of reference to another, irrespective of the magnitude of the strain, and leads to the evaluation of the principal strain components from the measurement of direct strain in three directions. A numerical example of application to the mechanics of metal cutting is given. (Modified author abstract) GRA

N74-28418# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
VIBRATIONS OF SHELLS, CHAPTER 8
V. V. Bolotin and V. N. Moskalenko 19 Mar. 1974 66 p refs Transl. into ENGLISH from the book "Prochnost i Ustoichivost-Kolebaniya" USSR, v. 3, 1968 p 418-467
(AD-777656; FTD-HC-23-1002-74) Avail: NTIS CSCL 20/11

Mathematical models are presented to analyze the vibration of thin elastic shells. Differential equations are developed based on the framework of Kirchoff-Lyav hypotheses. The relationships of the stresses in the median surface and the moments to deformations of the median surface and variations of curvatures are calculated in the case of an isotropic shell. Additional equations are shown for: (1) momentless theory, (2) theory of sloping shells, and (3) natural vibrations for circular cylindrical shells.
Author

N74-28419# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
EQUIPMENT AND TEST PROCEDURE FOR DETERMINING MULTIAXIAL TENSILE AND COMBINED TENSILE-COMPRESSIVE STRENGTH OF CONCRETE Final Report, Jul. 1967 - Dec. 1971
Kenneth L. Saucier Mar. 1974 65 p refs
(AD-777784; AEWES-TR-C-74-1) Avail: NTIS CSCL 13/3

A laboratory investigation was conducted to study the effect on strength of several multiaxial stress combinations related to shrinkage, temperature cracking, gravity, hydraulic loading, and foundation movement in a massive concrete structure. Based on the results of this investigation, the following conclusions appear warranted: (a) the strength of concrete in biaxial compression is at least as great as it is in uniaxial compression; (b) for the purposes of most design and analysis problems, use of an idealized interaction diagram for biaxial stresses appears feasible; (c) most design and analysis conditions involving biaxial compression plus uniaxial tension can be defined by a straight-line relationship between the points of maximum biaxial compression and uniaxial tension; and (d) unusually large induced tensile strains (=2000 millionths) may result from a condition of biaxial compression. (Modified author abstract) GRA

N74-28420# Army Missile Command, Redstone Arsenal, Ala. Systems Engineering Directorate.
STABILITY AND POSTBUCKLING BEHAVIOR OF HYPERELASTIC BODIES AT FINITE STRAIN BY THE FINITE ELEMENT METHOD
Donald W. Sandidge 25 Feb. 1974 61 p refs
(DA Proj. 1T0-1101-A-91A)
(AD-777789; RC-74-2) Avail: NTIS CSCL 20/11

The report presents an investigation of the application of the finite element method to the problem of stability and postbuckling behavior of hyperelastic bodies at finite strains. A brief summary of the formulations of finite element models of plane-isotropic hyperelastic bodies of Oden is given. The method of analysis centers around the powerful incremental loading techniques combined with Newton-Raphson corrections. These methods are supplemented with other techniques to also allow for the determination of critical load, the classifications of stability at critical loads and the study of postbuckling behavior. In conclusion, the method of solution is demonstrated by a number of representative numerical examples. Author (GRA)

33 THERMODYNAMICS AND COMBUSTION

Includes ablation, cooling, heating, heat transfer, thermal balance, and other thermal effects; and combustion theory. For related information see also: 12 Fluid Mechanics; and 27 Propellants.

N74-28421 Missouri Univ., Columbia.
CONDENSATION HEAT TRANSFER ON A ROTATING CYLINDER Ph.D. Thesis
Ming-Shiang Su 1972 230 p
Avail: Univ. Microfilms Order No. 74-9993

Both the theoretical and experimental approaches were made for condensation heat transfer a horizontal rotating cylinder. In regard to the theoretical approach for low speeds of a plain horizontal rotating cylinder, the interaction of the gravitational acceleration and the centrifugal acceleration caused the condensate film to become axis-asymmetric. As the rotating speeds increased, the centrifugal acceleration became dominant, the vapor-liquid interface was governed by the Taylor-instability and the condensate film became axis-symmetric containing drop-like profrusions. For horizontal rotating cylinders made from a series of uniform intersecting solid cones, a theoretical analysis indicated that the condensate film became plain and axis-symmetric at high rotating speed. All the experimental results showed a qualitative agreement with the theoretical predictions.
Dissert. Abstr.

N74-28422*# Southern Univ., Baton Rouge, La. Dept. of Mechanical Engineering.
[RADIATIVE PROPERTY INVESTIGATION] Final Report
Robert L. Scott, Jr. May 1974 132 p refs
(Grant NGR-19-005-009)
(NASA-CR-138459) Avail: NTIS HC $9.75 CSCL 20M

A detailed formulation of radiative heat transfer problems involving the use of bidirectional reflectance is discussed. Except for very simple systems this formulation is very intricate. For this reason and the fact that bidirectional data are scarce, such a formulation is not in common use. However, with the development of the digital computer there have been numerical methods developed for detailed radiative investigations using the bidirectional reflectance. Since computations using bidirectional reflectance are coming into use for spacecraft radiative studies, it is necessary to have reflectance data on the materials involved. Materials that are frequently studied are coatings which are used in controlling the thermal environment of spacecrafts. This study is primarily concerned with the bidirectional reflectance of zinc oxide which is one constituent commonly used for coatings.
Author

N74-28423*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
FULL-SCALE AIRCRAFT CABIN FLAMMABILITY TESTS OF IMPROVED FIRE-RESISTANT MATERIALS
Robert N. Stuckey, Daniel E. Surpkis, and L. James Price Jun. 1974 64 p refs
(NASA-TM-X-58141; JSC-09060) Avail: NTIS HC $6.25 CSCL 21B

Full-scale aircraft cabin flammability tests to evaluate the effectiveness of new fire-resistant materials by comparing their burning characteristics with those of older aircraft materials are described. Three tests were conducted and are detailed. Test 1, using pre-1968 materials, was run to correlate the procedures and to compare the results with previous tests by other organizations. Test 2 included newer, improved fire-resistant materials. Test 3 was essentially a duplicate of test 2, but a smokeless fuel was used. Test objectives, methods, materials, and results are presented and discussed. Results indicate that the pre-1968 materials ignited easily, allowed the fire to spread, produced large amounts of smoke and toxic combustion products, and resulted in a flash fire and major fire damage. The newer fire-resistant materials did not allow the fire to spread. Furthermore, they produced less, lower concentrations of toxic combustion products, and lower temperatures. The newer materials did not produce a flash fire.
Author

N74-28424*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
THE EFFECT OF ABLATION INJECTION ON RADIATIVE AND CONVECTIVE HEATING
James N. Moss Jun. 1974 7 p refs Presented at the 10th Anniv. Meeting of the Soc. of Eng. Sci., 1973 Submitted for publication
(NASA-TM-X-71976) Avail: NTIS HC $3.00 CSCL 20M

A viscous shock-layer analysis is for calculating high energy equilibrium flow fields about blunt axisymmetric bodies is applied to the problem of massive ablation injection with radiation transport. A nongray radiation model is used that accounts for both line and continuum radiation. The solution method is direct and provides both stagnation and downstream solutions. Results for shock heated air show that phenolic-nylon injection is substantially more effective in reducing the wall radiant flux than air injection. Also, for large included body angles, the wall radiative flux and the coupled phenolic-nylon injection rate do not continue to decrease with increasing distance downstream. Author

N74-28425*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMODYNAMIC ANALYSIS OF AN AXIAL-FLOW LASER-POWERED THRUSTER
Albert F. Kascak Washington Jun. 1974 22 p refs
(NASA-TM-X-3077; E-7891) Avail: NTIS HC $3.00 CSCL 20M

A one-dimensional model of a laser-powered thruster is analyzed. The model consists of two flow regions: a laser-heated region and a coaxial region outside the laser region. Different bulk velocities and temperatures are assigned for each region, and a common pressure is assigned for both regions. The one-dimensional inviscid flow equations are solved for each region with the same initial conditions. The results indicate that in order to prevent choked flow while increasing the anthalpy of the inlet gas by a factor of 10, the initial Mach number must be less than 0.14. For hydrogen gas seeded with 10 percent tungsten and entering the thruster tube at 10 atm and 300 K and a laser beam one-half the area of the tube, a tube length between 20 and 50 cm is required to vaporize the particles. Author

N74-28426# Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
A THEORETICAL AND EXPERIMENTAL STUDY OF TURBULENT DIFFUSION FLAMES IN CYLINDRICAL FURNACES
S. E. Elghobashi and W. M. Pun Apr. 1974 53 p refs
(HTS/74/16) Avail: NTIS HC $5.75

Turbulent diffusion flames in a small, axisymmetrical cylindrical furnace are studied, using town gas. Results are reported of the measurements made by an ionization probe of the probability of reaction at many locations inside the furnace. Predictions are also obtained for the experimental conditions by numerical solution of a set of six simultaneous, elliptic, partial differential equations. The time-mean hydrodynamic characteristics are described by the four variables: stream function, vorticity, turbulence kinetic energy and the rate of dissipation of turbulence energy; the reaction is described by the time-mean mixture fraction, and the mean-squared fluctuations of the mixture fraction. Author

N74-28427# Weapons Research Establishment, Salisbury (Australia).
ANALYSIS OF HEATING AND ABLATION OF A HYPERSONIC TEST VEHICLE
R. L. Pope Oct. 1973 23 p refs
(WRE-TN-1032(WR/D)) Avail: NTIS HC $4.25

The results of the heating experiment, conducted using the hypersonic research vehicle, HRV 929, are given. Some analysis of the results is described and comparisons are made with theoretical estimates. The main ablating material used was DC 589 silicon rubber. Thin steel panels were included and temperature records from thermocouples attached to the inner surface of these panels are used to obtain experimental values for the heat transfer. Author

N74-28428# Defence Standards Labs., Maribyrnong (Australia).
PRACTICE BOMB SIGNAL CARTRIDGE FOR ROYAL AUSTRALIAN AIR FORCE
P. J. Humphris, S. L. Howlett, and J. R. Bentley Feb. 1974 26 p ref
(TN-328) Avail: NTIS HC $4.50

The high failure rate of the BDU-33 25 lb practice bomb, in service with the RAAF, was investigated. The cause of the failures was established and a new cartridge and striker was designed, which has given 100% success on the design proving trials. Author

N74-28429# Defence Standards Labs., Maribyrnong (Australia).
AUXILIARY EXPLOSIVE DEVICES FOR THE IKARA ANTISUBMARINE WEAPON SYSTEM
S. L. Howlett and P. J. Humphris Mar. 1974 20 p ref
(DSL-Rept-585) Avail: NTIS HC $4.00

The auxiliary explosive devices fitted to the Ikara Antisubmarine Missile are discussed. The construction and performance of the devices are described and the function in the missile is briefly reported. A list of drawings, reports and specifications concerned with the devices is given. Author

N74-28430# Eidgenoessiches Institut fuer Reaktorforschung, Wurenlingen (Switzerland).
HEAT TRANSFER TO FLOWING SODIUM. THEORETICAL AND EXPERIMENTAL INVESTIGATIONS ON TEMPERATURE PROFILES AND TURBULENT TEMPERATURE FLUCTUATIONS IN A TUBE
H. Fuchs Aug. 1973 389 p refs In SWEDISH and ENGLISH
(EIR-241) Avail: AEC Depository Libraries HC $21.50

Heat transfer theories for liquid metals are mostly based on velocity data. Temperature distributions are derived by means of the eddy diffusivity concept. A number of theories are critically reviewed; the two principal areas of uncertainty are identified as: (1) choice of appropriate velocity data and (2) choice of relistic eddy diffusivity ratios. A review of pertinent experimental data shows that reliable data for sodium is rather scarce. Measurements of temperature profiles in sodium were performed. Turbulent temperature fluctuations are of interest both for advanced theories and practical applications. However, most of the existing data refer to mercury. Within the mentioned parameters, temperature fluctuations is sodium were measured with thermocouples of 0.5 mm and are reported as rms-values, probability density, auto- and cross-correlations and spectral densities. Author (NSA)

N74-28431# Sandia Labs., Albuquerque, N.Mex.
TEMPERATURE MEASUREMENT IN A HIGH-TEMPERATURE CARBON MULTILAYER REENTRY VEHICLE HEATSHIELD
G. R. Wright, Jr., S. G. Beard, Jr., and D. F. McVey [1974] 7 p refs Presented at the 13th Intern. Conf. on Thermal Conductivity, lake Ozark, Missouri Sponsored by AEC
(SLA-73-8014; Conf-731106-3) Avail: NTIS HC $3.00

Temperatures in a carbon/carbon heat shield consisting of a carbon composite ablator and carbon insulator over a metallic substructure were measured. The thermal sensors used on the test flights were required to: (1) operate over a range of temperatures from 300 K to approximately 2200 K, (2) remain operational throughout the time of significant aerodynamic heating which was less than one minute; (3) respond to rates of temperature increase of the order of 1000K/s; (4) measure material interface temperatures for comparison with computed values; (5) match the thermal cross section of the insulator as closely as possible; and (6) reduce or prevent chemical reactions between thermocouple junctions and the high temperature carbon. A thermal sensor that meets the above requirements is described. A comparison between temperatures measured with the sensor and the computed values is presented. Author (NSA)

N74-28432# Princeton Univ., N.J. Plasma Physics Lab.
THERMAL STRESS UNDER HIGH POWER SURFACE HEATING
J. F. Schivell and D. J. Grove Nov. 1973 13 p refs
(Contract AT(11-1)-3073)
(MATT-1010) Avail: NTIS HC $3.00

Estimates are made of thermal stress in a wall subjected to transient heating on one side. A detailed calculation is carried out for a flat plate heated on one face and cooled on the other. These examples furnish a guide to power absorption limits for surfaces in high-power plasma devices. Figures of merit are tabulated for various possible materials. Author (NSA)

N74-28433# Columbia Univ., New York. Liquid Metals Research Lab.
HIGH-TEMPERATURE THERMAL PROPERTIES OF LIQUID METALS, GASES, AND VAPORS Progress Report, 1 Oct. 1972 - 30 Sep. 1973
C. F. Bonilla 1 Sep. 1973 16 p refs
(Contract AT(11-1)-3027)
(COO-3027-15) Avail: NTIS HC $3.00

The determination, interpretation, and correlation of thermophysical properties and processes of fluids used or considered for use as nuclear reactor coolant and nuclear power cycle working fluids are discussed. Particular attention was given to high temperature and high pressure thermodynamic and transport properties of the alkali metals, most specifically sodium, potassium, lithium, and mercury. Author

N74-28434# General Electric Co., Bay Saint Louis, Miss. Hazards Evaluation, Research and Engineering.
HAZARDS CLASSIFICATION OF FLAMMABLE AND OXIDIZING MATERIALS FOR TRANSPORTATION. EVALUATION OF TEST METHODS (PHASE 2) Final Report
R. Hough, A. Lasseigne, and J. Pankow Apr 1973 83 p refs
(Contract DPT-AS-10058)
(PB-227019/7; DOT-TES-20-73-1) Avail: NTIS HC$4.00 CSCL 21B

Specific discrepancies in the evaluation of flammable liquids classification, and data for classifying additional materials for transportation are reported. A recommended system for classifying solid flammable and oxidizing materials, and a preliminary evaluation on hazards classification tests of flammable liquids is also discussed. GRA

N74-28435# Department of Defense Explosives Safety Board, Washington, D.C.
MINUTES OF THE 15TH EXPLOSIVES SAFETY SEMINAR, VOLUME 2
20 Sep. 1974 694 p refs Conf. held in San Francisco, 18-20 Sep. 1973
(AD-775660) Avail: NTIS CSCL 19/11

The topics discussed at the seminar were mostly on explosion effects, blast, accidents, safety and hazard classification, storage, containerization, jet fuel fires, ammunition powders, gelled nitromethane and solid rocket propellants. GRA

N74-28436# Bureau of Mines, Bartlesville, Okla. Energy Research Center.
EMISSION CHARACTERISTICS OF AN AIRCRAFT AUXILIARY POWER UNIT
F. W. Pann and W. F. Marshall Mar. 1973 19 p refs Previously announced as N73-19947 Sponsored by EPA
(PB-228782/9; BM-RI-7735) Avail: NTIS HC $3.00 CSCL 21E

An aircraft auxiliary power unit (APU) was used as an exhaust source for evaluation and refinement of sampling and analytical procedures for gas turbine engines. The unit was also used to determine the emission characteristics of APU's in service and to study the effect of fuel composition and combustor design on exhaust emissions. Results showed that emissions were near the minimum levels with the standard combustor and jet A fuel. Emission rates were highly dependent on test mode, but emission patterns as a function of test mode were similar for all fuels and combustors tested. A comparison of three identical design production combustors showed a variation in average emission rates of less than 5%. Analyses showed good repeatability and adequate sensitivity was attained in these experiments. Results of these tests showed that analysis for NO2 was required in order to obtain a good measure of total oxides of nitrogen. (Modified author abstract) GRA

N74-28437# Naval Postgraduate School, Monterey, Calif.
LIQUID CRYSTAL MAPPING OF THE SURFACE TEMPERATURE ON A HEATED CYLINDER PLACED IN A CROSSFLOW OF AIR M.S. Thesis
Richard Johns Field Mar. 1974 72 p refs
(AD-777862) Avail: NTIS CSCL 14/2

A liquid cyrstal thermographic technique has been developed which provides an excellent means of obtaining both qualitative and quantitative heat transfer information on heated objects placed in forced convection environments. Circumferential variation of the Nusselt number on a uniformly heated right circular cylinder cooled by forced convection was obtained for Reynolds numbers varying from 38,000 to 148,000. The results compare within the experimental uncertainty in forward stagnation regions with the theory of Schuh. Beyond approximately 30 degrees, the results diverge from theory but are consistent with the work of other investigators. Author (GRA)

N74-28438# Geological Survey, Menlo Park, Calif. Water Resources Div.
HANDBOOK OF THERMODYNAMIC DATA
G. B. Naumov, B. N. Ryzhenko, and I. L. Khodakovsky Jan. 1974 373 p refs Transl. into ENGLISH of the publ. "Handbook of Thermodyanic Data" Moscow, Atomizdat., 1971
(PB-226722/7; USGS-WRD-74-001) Avail: NTIS HC $7.75 CSCL 07D

A compilation by Russian scientists of thermodynamic data, entropies, enthalpies, free energies, heat capacities, mole volumes, solubilities, ionozation, activity coefficients, electrode potentials, and activity and fugacity coefficients for inorganic solids, liquids, gases, and solutes. The compilation includes many data previously unavailable in English. GRA

N74-28012* Scientific Translation Service, Santa Barbara, Calif.
THERMAL REGIME AND TEMPERATURE STRESSES IN BODIES DURING THERMORADIATIONAL HEATING
N. V. Chistopyanova and V. L. Chumakov *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 88-98 refs Transl. into ENGLISH from the book" Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 49-54 (For availability see N74-28003 17-18)
CSCL 20M

N74-28014* Scientific Translation Service, Santa Barbara, Calif.
TRANSIENT COOLING OF SOLID BODIES OF CLASSICAL FORM BY RADIATION
V. S. Novikov and V. L. Chumakov *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 113-120 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 60-63 (For availability see N74-28003 17-18)
CSCL 20N

N74-28015* Scientific Translation Service, Santa Barbara, Calif.
THERMOCAPILLARY CONVECTION IN WEIGHTLESS CONDITION
V. G. Babskiy, I. L. Sklovskaya, and Yu. B. Sklovskiy *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 121-130 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 63-68 (For availability see N74-28003 17-18)
CSCL 20M

N74-28016* Scientific Translation Service, Santa Barbara, Calif.
HEAT TRANSFER WITH NUCLEATE BOILING OF LIQUIDS UNDER WEAK MASS FORCE FIELD CONDITIONS
Yu. A. Kirichenko *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 131-159 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 68-81 (For availability see N74-28003 17-18)
CSCL 20M

N74-28017* Scientific Translation Service, Santa Barbara, Calif.
RADIATIVE COOLING OF BODIES OF ARBITRARY SHAPE AND VARIABLE VOLUME IN VACUUM

V. S. Novikov and V. L. Chumakov *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 160-168 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 82-85 (For availability see N74-28003 17-18)
CSCL 20M

N74-28018* Scientific Translation Service, Santa Barbara, Calif.
NONLINEAR UNSTEADY CONTACT HEAT CONDUCTION OF TWO-LAYER SHELLS IN THE PRESENCE OF THERMAL RADIATION
V. S. Novikov and V. L. Chumakov *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 169-177 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Nauko Dumka, 1973 p 86-90 (For availability see N74-28003 17-18)
CSCL 20M

N74-28019* Scientific Translation Service, Santa Barbara, Calif.
CALCULATION OF THE HYDRODYNAMIC AND HEAT TRANSFER PROCESSES OCCURRING DURING FILLING, PRESSURIZING, AND EMPTYING OF CRYOGENIC VESSELS
I. S. Zhitomirskiy and V. I. Pestryakov *In its* Space Studies in the Ukraine, No. 1 (NASA-TT-F-15535) Jun. 1974 p 178-198 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 1, Kosmicheskoye Materialovedeniye i Tekhnologiya" Kiev, Naukova Dumka, 1973 p 90-99 (For availability see N74-28003 17-18)
CSCL 20M

N74-28027 Montana Power Co., Butte.
LOW GAS TEMPERATURE SOLUTION TO HIGH RESISTIVITY ASH PROBLEMS
D. T. Berube *In* Bur. of Mines Technol. and Use of Lignite 1972 p 70-82 ref (For availability see N74-28020 17-18)

N74-28283* Kanner (Leo) Associates, Redwood City, Calif.
METHOD OF CALCULATING GAS DYNAMICS AND HEAT TRANSFER IN SINGLE STAGE REFRIGERATION UNITS
I. S. Zhitomirskiy and A. B. Popolskiy *In its* Space Res in the Ukraine, No. 3 (NASA-TT-F-15537) May 1974 p 124-138 refs Transl. into ENGLISH from the book "Kosmicheskiye Issledovaniya na Ukraine, Vypusk 3, Fizika Kosmosa i Astronomiya" Kiev, Naukova Dumka, 1973 p 80-90 (For availability see N74-28272 17-30)
CSCL 20M

34 GENERAL

Includes information of a broad nature related to industrial applications and technology, and to basic research; defense aspects; information retrieval; management; law and related legal matters; and legislative hearings and documents.

N74-28439# Kentucky Univ., Lexington. Dept. of Economics.
THE WESTERN KENTUCKY COAL INDUSTRY: AN ECONOMIC ANALYSIS
Curtis E. Harvey May 1973 99 p refs Revised
(UKY-TR76-73-IMMR1) Avail: NTIS HC $8.00

An economic analysis and investigation into the structure of the Western Kentucky coal industry are provided. Employment and the relative size of the coal industry are discussed along with estimated remaining coal reserves in the state. Demand and supply factors, and the regional structure of the markets for coal mined in the eastern interior basin are considered. Mining operations, costs of production, transportation, and the price of coal are reported and the prospects for economic change in the Kentucy coal industry considered. A.A.D.

N74-28440# Committee on Foreign Affairs (U. S. House).
THE ENERGY CRISIS: IMPACT OF CANADIAN POLICIES
Washington GPO 1974 132 p Hearings before Comm. on Foreign Affairs, 93d Congr., 1st Sess., 14-15 Nov. 1973
(GPO-27-709) Avail: Subcomm. on Inter-American Affairs

The hearings are reported concerning the impact on the U.S. of the Canadian actions to restrict the export of oil. The immediate effects on the border States are discussed with emphasis on the impending shortage of heating fuels. The Canadian-American energy relationship is also discussed. F.O.S.

N74-28441# Committee on Agriculture (U.S. House).
AGRICULTURE AND THE FUEL CRISIS
Washington GPO 1974 140 p refs Hearings before Comm. on Agr., 93d Congr., 1st Sess., 14 Nov. and 4 and 14 Dec. 1973
(GPO-27-899) Avail: Comm. on Agr.

A Congressional hearing concerning the impact of the fuel shortage on farming operations was conducted. The manner in which fuel is allocated according to Federal legislation was analyzed. The need for changes in the legislation was discussed and many examples of the inequities created by the current restrictions were explained. Testimony of specified witnesses from the agricultural community and the oil industry is submitted. The economic aspects of the fuel shortage on various phases of domestic and foreign relations are examined. P.N.F.

N74-28442* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE PROJECT MANAGEMENT ROLE IN SAFETY
R. C. Callaway Jun. 1974 31 p refs Revised Previously announced as N73-28937
(NASA-TM-X-64764) Avail: NTIS HC $3.25 CSCL 13L

Techniques to be utilized by project management in planning, implementation, and administration of a project safety program are presented. Safety functional responsibilities are classified into the categories of safety management and safety engineering. The emphasis is on the safety management role, and how safety activities are to be integrated throughout the project and made visible in the work breakdown structure and cost accounting and reporting. Visibility into systematic identification and control of hazards are discussed. Author

N74-28443*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
CALIFORNIA FOUR CITIES PROGRAM, 1971 - 1973
H. L. Macomber and James H. Wilson 15 May 1974 44 p refs
(Contract NAS7-100)
(NASA-CR-138768; JPL-SP-43-4) Avail: NTIS HC $5.25 CSCL 05K

A pilot project in aerospace-to-urban technology application is reported. Companies assigned senior engineering professionals to serve as Science and Technology Advisors to participating city governments. Technical support was provided by the companies and JPL. The cities, Anaheim, Fresno, Pasadena, and San Hose, California, provided the working environment and general service support. Each city/company team developed and carried out one or more technical or management pilot projects together with a number of less formalized technology efforts and studies. An account and evaluation is provided of the initial two-year phase of the program. Author

N74-28444# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
[RESEARCH ON AERODYNAMICS, SPACE DYNAMICS, FLUID MECHANICS, AND LASERS] Annual Progress Report, 1973
1973 165 p refs
Avail: NTIS HC $11.25

Ongoing research and development projects are summarized along with data pertaining to test equipment and significant results. Subjects of the research include: (1) laser excitation; (2) aerodynamic noise; (3) subsonic aerodynamics; (4) materials science and structures; (5) rocket research; (6) air cushion technology; (7) molecular beam and space simulation; and (8) gas dynamics. Reports, technical notes, books and open literature publications written by the staff members as a result of the work are listed. A.A.D.

N74-28445# Committee on Public Works (U. S. Senate).
COMPLIANCE WITH TITLE 2 (AUTO EMISSION STAND-

ARDS) OF THE CLEAN AIR ACT
Washington GPO 1973 960 p refs Hearings before Comm. on Public Works, 93d Congr., 1st Sess., 5-6 Nov. 1973
(GPO-25-424) Avail: Comm. on Public Works

The acceptability of emission control technologies slated by the auto and fuel industries to meet the 1975 deadlines of the Clean Air Act was the subject of a Congressional hearing. Questions regarding the ramifications of national application of catalytic converters are discussed and the costs, both public and private, of antipollution technologies are outlined. Fuel economy factors, as they relate to emission control efforts, are reported. Results of tests on pollution control configurations and fuels are presented along with their performance comparisons. Air quality indexes are presented and recommendations are made throughout on how best to accomplish compliance with the Clean Air Act at minimum cost and maximum efficiency. A.A.D.

N74-28446*# General Electric Co., Philadelphia, Pa. Space Div.
STUDY FOR IDENTIFICATION OF BENEFICIAL USES OF SPACE (BUS) (PHASE 2). VOLUME 1: EXECUTIVE SUMMARY Final Report
1 Nov. 1973 19 p ref
(Contract NAS8-28179)
(NASA-CR-120285; DOC-73SD4281-Vol-1) Avail: NTIS HC $4.00 CSCL 05A

A study was conducted to analyze the benefits to the world which can be realized from space manufacturing processes. The study envisaged the use of the space shuttle and manned space stations for the purpose. For each proposed operation a data base and rationale were established for those processes or portions of processes which would be improved by performance in the orbital environment. The four experiments which were recommended for the initial investigation are identified. The procedures for conducting the weightless manufacturing processes are outline. Author

N74-28447*# General Electric Co., Philadelphia, Pa. Missile and Space Div.
STUDY FOR IDENTIFICATION OF BENEFICIAL USES OF SPACE (BUS). VOLUME 2: TECHNICAL REPORT, BOOK 1: SECTIONS 1 THROUGH 4 Final Report on Phase 2, Dec. 1972 - Dec. 1973
1 Nov. 1973 256 p refs 2 Vol.
(Contract NAS8-28179)
(NASA-CR-120286; DOC-73SD4281-Vol-2-Bk-1) Avail: NTIS HC $16.00 CSCL 05A

Consolidated information is presented for the study whose purpose was to identify products, processes, and services to be produced in future spacecraft environments for direct utilization on earth. Discussion of methodology for selecting from among potential space processing approaches, definition of requirements for experiments and tests needed to acquire sufficient knowledge for proof testing of selected processes, formulation of research and development schedules to achieve proof testing, and documentation of the decision processes involved in the programs are presented. Technology and programmatics are reported for the following select studies: (1) surface acoustic wave components; (2) transparent oxides; (3) high purity tungsten X-ray targets; and (4) high specificity isoenzymes. A.A.D.

N74-28448# Translation Consultants, Ltd., Arlington, Va.
IT TAKES MORE THAN TEN FILES TO MAKE A DATA BANK
Ulrich Guenther 1974 25 p refs Transl. into ENGLISH from Umwelt, v. 3, 1973 p 37-42 Sponsored by EPA
(APTIC-51375; TR-182-74) Avail: NTIS HC $4.25

Basic considerations for the design of environmental data banks and a concept for their structuring are presented. Data acquisition and transmissions, compatibility and updating, flexibility and cost effectiveness, and data requirements are discussed. A program model for air quality which contains both emission and immission registers is described along with the implications for a comprehensive environmental planning information system. A.A.D.

N74-28449# Committee on Banking, Housing and Urban Affairs (U.S. Senate).
RETAIL PRICING OF PETROLEUM PRODUCTS
Washington GPO 1973 99 p Hearings on S. 2415, S. 2400, and S. 2453 before Comm. on Banking, Housing and Urban Affairs, 93d Congr., 1st Sess., 9 Oct. 1973
(GPO-23-614) Avail: Comm. on Banking, Housing and Urban Affairs

A Congressional hearing was conducted to consider the retail pricing of petroleum products. The specific purposes of the the hearing were: (1) to amend the Economic Stabilization Act of 1970 to permit the passthrough of certain cost increases, (2) to amend the Economic Stabilization Act of 1970 to adjust ceiling prices applicable to certain petroleum products and to permit retailers to pass through the increased costs, and (3) to amend the Economic Stabilization Act with regard to the authority conferred by Section 203 with respect to petroleum products. The findings of the committee are based on the testimony of selected witnesses with experience in the petroleum market. P.N.F.

N74-28450# Committee on Armed Services (U. S. Senate).
NAVAL PETROLEUM RESERVE NUMBERED 1, ELK HILLS, CALIFORNIA
Washington GPO 1973 114 p refs Hearing on S.J. Res. 176 before Comm. on Armed Services, 93d Congr., 1st Sess., 10-11 Dec. 1973
(GPO-25-650) Avail: Subcomm. on Natl. Stockpile and Naval Petrol. Reserve

A Congressional hearing was conducted to consider a resolution which would authorize production of petroleum from the Elk Hills Naval Petroleum Reserve for national defense purposes and to provide for further exploration of the reserve. The nature of the petroleum shortage in the U.S. is examined. The capacity of the petroleum reserve to alleviate the situation is evaluated. Restrictions on the exploitation of the reserves are defined. The findings of the committee are based mainly on the testimony of selected witnesses who are knowledgeable of the crude oil situation. P.N.F.

N74-28451# Select Committee on Small Business (U. S. House).
THE TECHNOLOGY UTILIZATION PROGRAM OF THE SMALL BUSINESS ADMINISTRATION
Washington GPO 1973 21 p Presented by the Select Comm. on Small Business to the Comm. of the Whole House on the State of the Union, 93d Congr., 1st Sess., 10 Aug. 1973
(H-Rept-93-450; GPO-99-006) Avail: US Capitol, House Document Room

The achievements and significance of the Small Business Administration (SBA) in obtaining technology transfers for small business concerns is reviewed in preface to a Congressional recommendation that the SBA Technology Utilization Program be reinstated. The continuation and possible expansion of the program is urged in a committee resolution and recommendations are outlined to aid the SBA in resuming its technology transfer activities. A.A.D.

N74-28452# Joint Economic Committee (U. S. Congress).
ECONOMIC IMPACT OF PETROLEUM SHORTAGES
Washington GPO 1974 197 p refs Hearings before Joint Econ. Comm., 93d Congr., 1st Sess., 11-13 Dec. 1973
(GPO-27-213) Avail: SOD HC $1.50

Both the short run and long run implications of the energy crisis are discussed in a Congressional hearing conducted to gather information towards the formulation of an effective energy policy. The Arab oil embargo is analyzed for its effect on real growth forecasts and rising inflation. A summary of the oil shortages in the U.S. petrochemical industry includes tabulation of production decline in the manufacture of organic chemicals, plastic resins, synthetic fibers and rubber, and related industries. Administration projection of near term petroleum shortfall are reported and proposed remedies include reduction in jet aircraft flights, reduction in residential heating, reduction in business, government, and industry power use, expansion of rail and bus transit systems, conversion of power plants to coal, and a gasoline tax. The impact of the fuel shortage on Canada is presented for comparison. A.A.D.

N74-28453# Committee on Finance (U. S. Senate).
PROFITABILITY OF DOMESTIC ENERGY COMPANY

OPERATIONS
Washington GPO 1974 222 p refs Hearings before Comm. on Finance, 93d Congr., 2d Sess., 13-14 Feb. 1974
(GPO-28-572) Avail: Comm. on Finance

A Congressional hearing was conducted to present testimony relating to the problem for excess or windfall profits in the oil industry. Tax legislation proposals are emphasized. Information is presented by private firms and by petroleum trade associations, and the topics include the following: (1) percent of U.S. production by medium and small companies; (2) petroleum exploration and development expenditures; (3) profitability ratios; (4) sources of U.S. sales of petroleum products and foreign investments; (5) imports of crude oil and refine products; (6) gasoline and residual fuel consumption; (7) return on petroleum shareholders equity; and (8) earning growth and return calculations. Recommendations are made for the formulation of tax and price policies as well as effective government/industry roles in the management of the energy market. A.A.D.

N74-28454# Joint Publications Research Service, Arlington, Va.
RISK, CONFLICT, AND UNCERTAINTY IN DECISION MAKING AND IN ITS SIMULATION
V. D. Rudashevskiy 10 Jun. 1974 16 p refs Transl. into ENGLISH from Vop. Psikhologii (Moscow), no. 2, 1974 p 84-94
(JPRS-62211) Avail: NTIS HC $4.00

An analysis of the dominant role in the process of decision making which is played by such psychological components of the problematic situation as risk, conflict, and uncertainty was conducted. It is stated that the flow of information on the basis of these factors may serve as a universal indicator of psychological processes. Since this indicator can be measured, it may serve as an indispensable instrument for accurate perception of sociopsychological models and their transposition to the level of engineering-psychological models. The application of games theory to investigations on optimum behavior is reported. The interaction of the external environment and the previous experience of the subject is analyzed. Author

N74-28455# National Academy of Engineering, Washington, D.C. Committee on Technology Transfer and Utilization.
TECHNOLOGY TRANSFER AND UTILIZATION: RECOMMENDATIONS FOR REDIRECTING THE EMPHASIS AND CORRECTING THE IMBALANCE Final Report
Feb. 1974 34 p refs
(Grant NSF C-310)
(PB-232123; NAE-COTTU-74) Avail: NTIS HC $4.75

A study to identify Federal agencies conducting programs directed toward technology transfer and utilization; determine and describe the methods used in programs, evaluate the effectiveness of methods, assess the extent these methods have been evaluated; and recommend policies for NSF and Federal government consideration. It was found that technology developed by federally funded programs since World War II has not resulted in widespread secondary applications of technology. An imbalance was found between the emphasis on collection, processing, and dissemination of technological information and the stimulation of secondary uses of technology. It is recommended the federal government redirect the emphasis and correct the imbalance by increasing funding for application, adaptation and utilization to at least the same level as that expended for information collection and dissemination. Other recommendations are made. Author

N74-28456*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
RECORDING AND CATALOGING HAZARDS INFORMATION, REVISION A
Richard J. Stein Jun. 1974 48 p refs Revised Previously announced as N73-31918
(NASA-TM-X-64782) Avail: NTIS HC $3.25 CSCL 05A

A data collection process is described for the purpose of discerning causation factors of accidents, and the establishment of boundaries or controls aimed at mitigating and eliminating accidents. A procedure is proposed that suggests a discipline approach to hazard identification based on energy interrelationships together with an integrated control technique which takes the form of checklists. Author

N74-28457*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
REVIEW OF HYDROGEN ACCIDENTS AND INCIDENTS IN NASA OPERATIONS
Paul M. Ordin 1974 41 p Proposed for presentation at 9th Intersoc. Energy Conversion Eng. Conf., San Francisco, 26-30 Aug. 1974
(NASA-TM-X-71565; E-7985) Avail: NTIS HC $3.25 CSCL 22D

A number of the accidents/incidents with hydrogen in NASA operations are reviewed. The cause factors for the mishaps are reviewed and show that although few accidents occurred, the number could have been further reduced if the established NASA rules and regulations had been followed. Requirements for effective safety codes and areas of study for hydrogen safety information are included. The report concludes with a compilation of 96 hydrogen mishaps; a description of the accidents and their causes. Author

N74-28458*# Scientific Translation Service, Santa Barbara, Calif.
VARIATIONAL ADJUSTMENT OF STANDARD AND ASYNCHRONOUS SATELLITE DATA
T. S. Pagava and M. S. Fuks-Rabinovich Washington NASA Jul. 1974 23 p refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 4, 1974 p 55-66
(Contract NASw-2483)
(NASA-TT-F-15688) Avail: NTIS HC $4.25 CSCL 05B

Techniques for three-dimensional adjustment of the fields of geopotential, temperature and wind speed based on the application of the variational techniques of adjustment are considered. Results illustrating the possibility of using those methods for the assimilation of asynchronous satellite data and for the construction of the geopotential field from measurements of temperature and wind speed are presented. Results illustrating stability of the variational method to errors of the initial temperature measurements are obtained. Author

N74-28459# Consejo Superior de Investigaciones Cientificas, Roquetas (Spain).
THE SOVIET SPACE PROGRAM [EL PROGRAMA ESPACIAL SOVIETICO]
Antonio Romana 1972 63 p In SPANISH
(Rept-276) Avail: NTIS HC $6.25

Soviet space investigations are discussed including the Soviet launches, Cosmos satellites, planetary exploration, and the Soyuz program. Transl. by F.O.S.

N74-28460# Defence Standards Labs., Maribyrnong (Australia).
ANNUAL REPORT, 1972 - 1973
1974 88 p refs
Avail: NTIS HC $7.50

The research projects conducted to provide technical and scientific support to a military organization are discussed. Emphasis is placed on environmental testing of protective coatings in a tropical atmosphere. Biologically active polymers were developed to provide anti-fouling coatings for boat hulls. Technical support was provided in the casting of mortar bomb bodies, and large marine engine components, the production of rubber components for tracked vehicles, the machining of metals, and the development of improved practice bombs. Failure analyses were conducted on silicone seals in aircraft oxygen equipment, (2) factory exhaust fans, (3) cracks in engineering structures, gun barrels, and power units of tanks. The design and construction of items of test equipment are reported. Author

N74-28461# Aeronautical Research Labs., Melbourne (Australia).
ANNUAL REPORT, 1972 - 1973
1973 81 p refs
Avail: NTIS HC $7.25

The accomplishments of the Aeronautical Research laboratories for 1972 to 1973 are discussed. The areas of interest are as follows: (1) background research for providing information on future problems, (2) research and development aimed at providing specific information either for design purposes or operational aspects, and (3) development of facilities and equipment to provide the experimental data needed in both areas mentioned. Specific tests were conducted to develop aircraft materials, aerodynamic

configurations, propulsion systems, and fatigue of structures.
Author

N74-28462*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A MARKOVIAN MODEL FOR ASSESSMENT OF PERSONNEL HIRING PLANS
Lawrence G. Katz Washington Jun. 1974 17 p refs
(NASA-TN-D-7640; G-7410) Avail: NTIS HC $3.00 CSCL 05C

As a result of the current economic environment, many organizations are having to operate with fewer resources. In the manpower area, these constraints have forced organizations to operate within well-defined hiring plans. Exceeding personnel ceilings is in most cases an intolerable situation. A mathematical model, based on the theory of Markov processes, is presented which can be used to assess the chances of success of personnel hiring plans. The model considers a plan to be successful if the final population size, at the end of the planning period, lies within a range specified by management. Although this model was developed to assess personnel hiring plans at the Goddard Space Flight Center, it is directly applicable wherever personnel hiring plans are used. Author

N74-28463# Bureau of Mines, Washington, D.C. Div. of Fossil Fuels.
SALES OF FUEL OIL AND KEROSINE IN 1972
10 Oct. 1973 14 p
Avail: NTIS HC $4.00

Domestic sales of distillate fuel oils, residual fuel oils, and kerosine in thousands of barrels are presented and compared to sales volume in 1971. Data are arranged by fuel type, intended uses, and state and year in which the transactions were made.
A.A.D.

N74-28464# Bureau of Mines, Washington, D.C. Div. of Fossil Fuels.
WORLD NATURAL GAS: 1972
29 Apr. 1974 10 p
Avail: NTIS HC $4.00

Both gross and marketed production volumes in million cubic feet are presented for all countries engaged in the natural gas industry. World trade volumes in billion cubic feet are also shown by year and importing country. A brief account of natural gas trends in domestic production and international trade is included.
A.A.D.

N74-28465# Atomic Energy Commission, Washington, D.C.
NATION'S ENERGY FUTURE Report to the President of the United States
Dixy Lee Ray 1 Dec. 1973 182 p
(WASH-1281) Avail: NTIS MF $1.45; SOD HC $1.95

This report, developed under the general guidance of the Energy Policy Office, is in response to the directive of the President on June 29, 1973, to the Chairman of the Atomic Energy Commission to review Federal and private energy R and D and to recommend an integrated program for the Nation. The report recommends: (1) a national energy R and D program, (2) a five-year, $10 billion Federal energy R and D program, and (3) the FY 1975 Federal budget for energy R and D. The recommended program, based on what is now known, is both necessary and sufficient to maximize energy R and D's contribution to the Nation's energy goals; even so, 1985 is the earliest date by which self-sufficiency can reasonably be expected. By 1980, the recommended program can reduce oil imports to half those currently projected; other extraordinary measures will be required to displace the other half.
NSA

N74-28466# RDP, Inc., Bedford, Mass.
NUMERICAL ANALYSIS AND SCIENTIFIC APPLICATIONS PROGRAMMING REPORT Final Scientific Report, 1 Sep. 1970 - 31 Aug. 1973
Richard W. Doherty, ed. 30 Sep. 1973 174 p refs
(Contract F19628-71-C-0048)
(AD-777136; AFCRL-TR-74-0051) Avail: NTIS CSCL 05/2

The report is presented to give a description of the numerical analysis and scientific applications programming support offered to Air Force Scientists engaged in basic research in the environmental sciences. The scope of problems reported both in the particular discipline supported and the type of support rendered is quite broad. Typically, theoretical nuclear studies involving numerical calculations of complicated double and triple integrals are contrasted to magnetic tape manipulation of countless experimental rocket-sampled data in electric field studies. The duration of support is just as varied and lasted anywhere from a few days to many months. Therefore, some of the problems reported upon are completely analysed while others have reached various degrees of evolution toward a complete final resolution.
Author (GRA)

N74-28467# Argonne National Lab., Ill. Energy and Environmental Studies Div.
TRANSPORTATION NOISE: IMPACTS AND ANALYSIS TECHNIQUES Final Report
K. E. Nelson and T. D. Wolsko Oct. 1973 124 p refs Sponsored by Ill. Inst. for Environ. Quality
(PB-226806/8; ANL-ES-27; IIEQ-73-16) Avail: NTIS HC $4.25 CSCL 13B

Background information and computerized models are presented, that can be used by transportation engineers, planners, and environmentalists to assess the impacts of transportation noise problems generated by highway and airport facilities. The characteristics of transportation noise are discussed in terms of generation, effects and impacts, measurement, and control. The economic, physiological, psychological, and societal effects of urban noise are described. A computerized highway noise model for the prediction of noise levels generated by proposed highways, is described and is accompained by a user's manual and a discussion of its application to transportation planning. Also described is a computerized noise model for the prediction of noise impacts of airports.
Author (GRA)

N74-28468# National Technical Information Service, Springfield, Va.
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Author (GRA)

N74-28469# National Technical Information Service, Springfield, Va.
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Author (GRA)

N74-28470# Environmental Protection Agency, Washington, D.C. Office of Research and Development.
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N74-28021 Bureau of Mines, Jackson, Miss.
A PROGRESS REPORT ON COAL MINE HEALTH AND SAFETY
Henry P. Wheeler, Jr. *In its* Technol. and Use of Lignite 1972 p 12-14 (For availability see N74-28020 17-18)

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Jack J. Ellis and Pete Bacchetti *In* Bur. of Mines Technol. and Use of Lignite 1972 p 15-31 (For availability see N74-28020 17-18)